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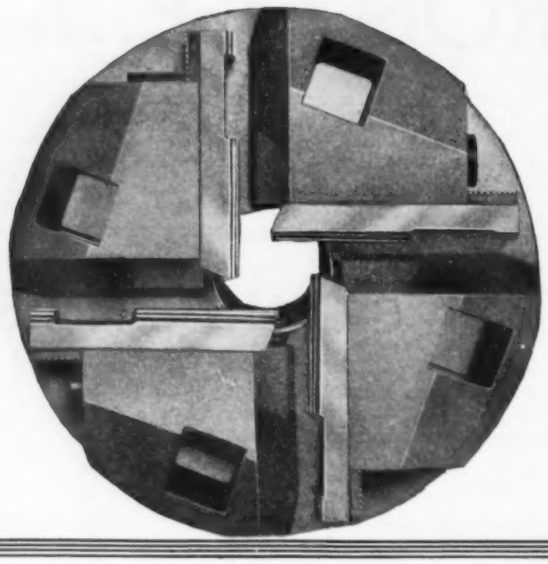

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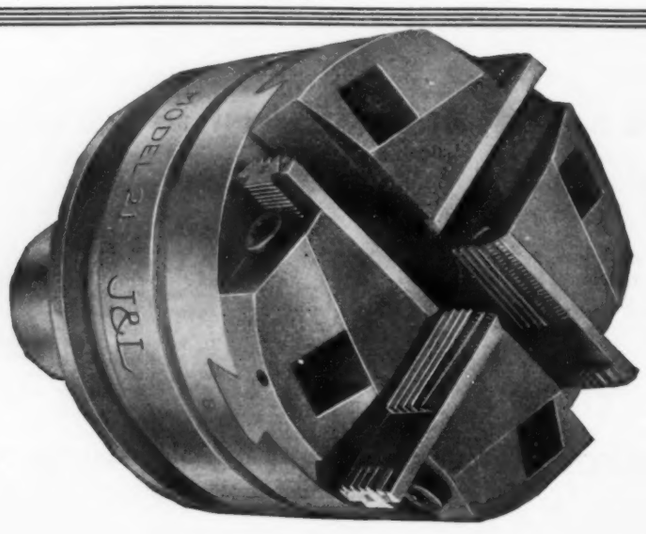

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PRESENT USE OF WELDING IN THE PRESSURE VESSEL FIELD

By WILLIAM SPRARAGEN

Secretary, American Bureau of Welding, New York

THE recently liberalized regulations of the boiler code committee of the American Society of Mechanical Engineers, permitting the use of welding in the pressure vessel field, means much for the future of welding. In this, the first half of his discussion, the author calls particular attention to the achievements of three American companies producing welded pressure vessels. Six fundamental factors in welding are laid down.

In the concluding portion, there will be discussed—stress relieving; hydrostatic, hammer impact and other tests for welds; the Kinzel-Miller formula, and the ductility of welded joints.

A GREAT advance for the use of welding in the pressure vessel field has now been made possible through the more liberalized rules and regulations on the part of the boiler code committee of the American Society of Mechanical Engineers. The present rules and regulations have been brought about as the result of several factors, the most important of which are: (1) A growing confidence in welding on the part of regulatory bodies; (2) the development of new materials and technique of welding which result in tensile strengths and ductilities not heretofore possible; (3) greater regularity in the quality of welds; (4) the development of non-destructive methods of testing welds; and (5) the economic need for welding as a means of fabricating vessels and drums of great thicknesses. These new rules were published in *Mechanical Engineering* in June, 1931, under the title, "Revisions and Addenda to the Boiler Construction Code."

Three Classes of Welds

Perhaps the greatest single departure from previous rules and regulations in regard to welding is the division of the quality of welds and grades of welding into three classes:

In Class 1, the joint efficiency may be taken as 90 per cent. Welds meeting the requirements of this class of vessels may be used for any purpose.

In Class 2, vessels are confined to pressures operating at 400 lb. per sq. in. or less, with a maximum temperature of 730 deg. F., and with a maximum plate thickness of 1½ in. The allowable joint efficiency for this class of vessels is 80 per cent. Vessels containing noxious gases are not permitted for this class of vessels.

In Class 3 the vessels are limited to plates not exceeding ¾ in. in thickness and temperatures not exceeding the boiling point of liquids at atmospheric pressure. The maximum allowable pressure is 200 lb. per sq. in., and maximum temperature 250 deg. F. Vessels containing noxious gases or liquids are not permitted in this classification. The allowable tensile strengths for vessels of this class are about the same as those prevailing heretofore. These are as follows:

	Lb.
Double-welded butt joints for all joints	8000
Single-welded butt joints for girth or head joints	6500

Double full-fillet lap welds for girth joints only	7000
Spot or intermittent welds for girth or head joints.....	5600

Single welded butt joints are given a rating of 5600 lb. per sq. in. for material less than ¼ in.

Attention is called to the fact that the thickness of the vessel does not primarily control classifications as, for example, a ⅝-in. vessel could be made to meet the requirements for Class 1 vessels. The requirements for these various classifications will be discussed in somewhat greater detail a little later.

WELDED fractionator tower for the Fort Worth Refinery of the Gulf Refining Co., Pittsburgh, is 9 ft. in diameter and 53 ft. long and equipped with 20 manways and numerous nozzles. Plate thickness is: Shell, 1¾ in.; heads, 1⅞ in.; tested to 550 lb. hydrostatic pressure. Its weight is 92.9 tons.

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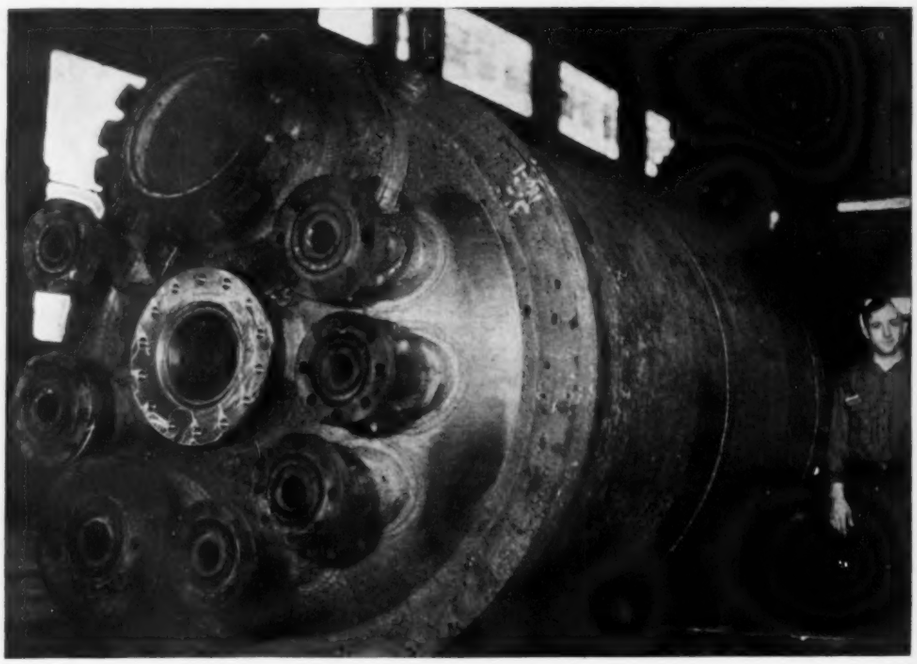


WELDED autoclave made by the A. O. Smith Corpn., for the Du Pont Co., has an inside diameter of 5 ft., wall thickness of 5 in. and overall length of 7 ft. 10 in.; the weight is 44,660 lb.

▼ ▼ ▼

Present Applications

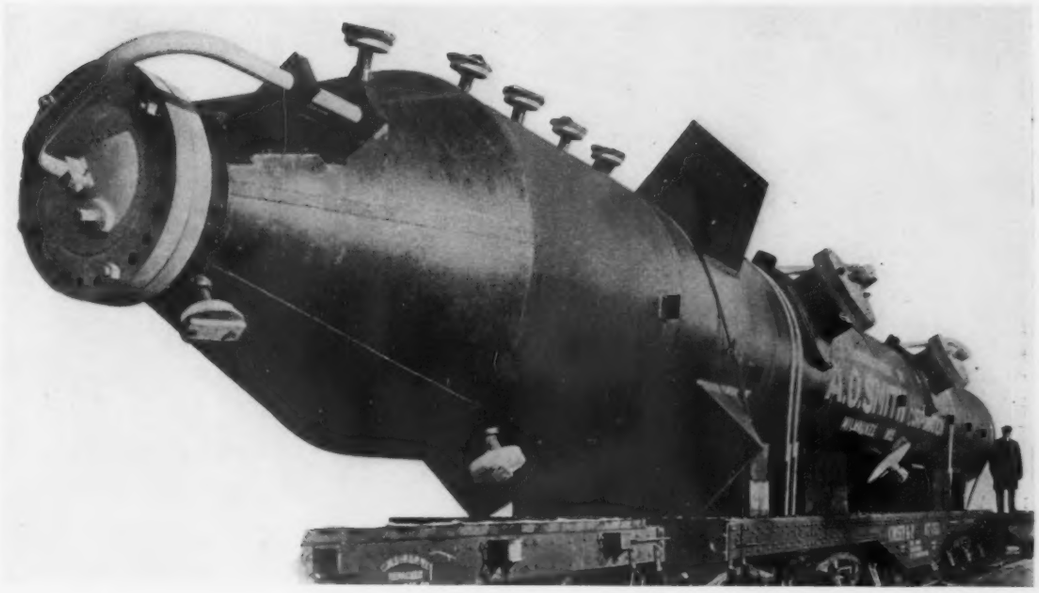
As in other fields, the application of fusion welding to the fabrication of pressure vessels and tanks of all kinds has been a gradual development. Unfortunately in the beginning, good design and construction were at times sacrificed in favor of cheapness which has resulted in tremendous damage to the prestige of the industry and has caused legislative bodies in the past to place severe restrictions on its use.

As a matter of fact, however, welding is admirably adapted for the fabrication of vessels of all kinds. When properly applied, a vessel may be made oil and gas tight practically up to pressures which would cause rupture of the material itself. We find, therefore, the various processes of welding used for the fabrication of vessels from the very light gages and small sizes to huge vessels required in chemical processes where the contents are subjected to great heat and pressure and the thickness of steel varies up to 4 in.

There is no application of welding that requires more complete control and closer adherence to the fundamental principles of welding than does the welding of pressure vessels. It can now be said that vessels of almost any thickness of materials commercially required can be satisfactorily welded although, of course, materials more than 1½ in. thick as yet require special processes.

Within the last few years more than 200 pressure vessels, ranging in diameter from 3 to 8 ft., having wall thicknesses up to 1¼ in. and carrying working pressures up to 300 lb. per sq. in., have been oxyacetylene-welded under the supervision of one company alone and have proved entirely satisfactory under service conditions.

The A. O. Smith Corpn., for example, which has developed a special technique and method for arc welding oil cracking stills and other high pressure vessels, has built 1700 vessels weighing approximately 52,000 tons. Most of these vessels are very large, ranging in diameter from 5 to 10 ft. and in length from 20 to 50 ft. The usual wall thicknesses vary from 2 to 3½ in., with some of them ranging as high as 5½ in. The very largest vessels have been approximately 100 ft. in length and a maximum inside diameter of 12 ft. A small percentage of the total number of vessels covers special constructions, such as alloy materials, steel vessels lined with alloy materials, special



WELDED oil cracking still for the Gulf Refining Co. has a length of 70 ft. and inside diameter of 7 ft. The thickness of the cone is 3⅞ in. and that of the shell is 3½ in. The shipping weight was 195,000 lb. This vessel operates at about 1000 deg. F. and 400 lb. pressure.

high strength steel vessels and laminated vessels.

They use a process which is a fusion operation in a reducing atmosphere which completely eliminates oxide inclusions and other impurities from the weld, leaving a metal of greater refinement than that of the plates joined. This company states that test bars, machined out of the deposited metal in a weld joining 0.20-0.30 per cent carbon steel plates, have regularly given the following results:

	Lb. per Sq. In.
Ultimate tensile strength	66,000
Elastic limit	50,000
	Per Cent
Elongation	27
Reduction in area	53

Endurance tests reported by this company on joining 0.20-0.30 per cent carbon steel plates showed the endurance limit of the deposited metal to be at least 10 per cent above that of the plate material. The metal immediately adjacent to the weld showed an improvement of about 4 per cent, and at no point was there any decrease in the endurance limit below the value given for the plate itself.

Still a third company using special technique in welding, covered electrodes of large diameters with special alloys, peening each layer, employing heavy currents, and keeping the metal in a molten state for an appreciable length of time, has satisfactorily demonstrated its ability to build vessels of almost any commercial size or thickness. The physical properties of the welded joints approximate those given above.

Both of these companies anneal the vessel after its completion. It should be noted that these are special methods and the ordinary arc welds made by hand operators do not possess these desirable characteristics. Several methods are, however, available for commercial use that give welds of good ductility.

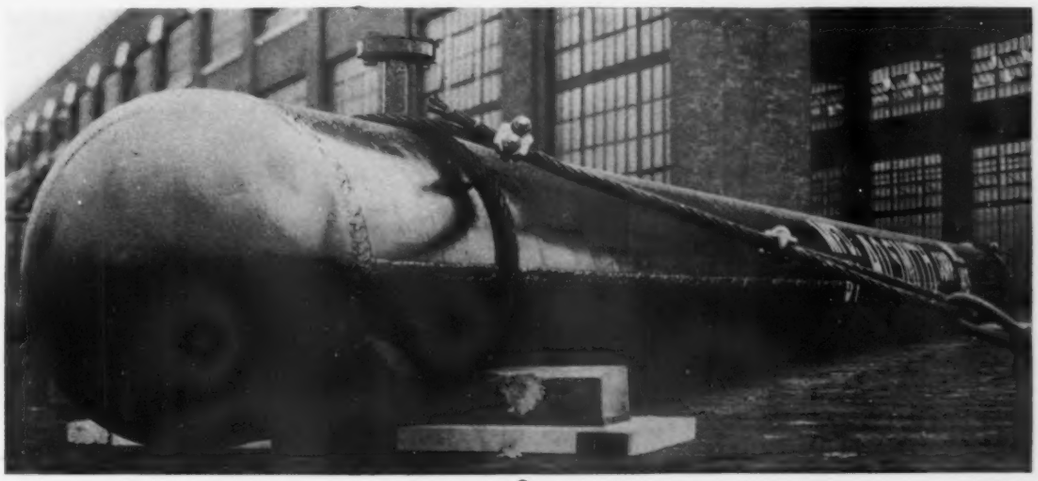
As in other important construction work, the fundamental factors to be considered are:

1.—Selection of material of good welding quality and the use of good welding wire.
2.—Correctly designing the vessel and welded joints.
3.—The use of qualified welders.
4.—Properly preparing the material for welding.
5.—Employment of proper technique.
6.—Testing of the completed vessel.

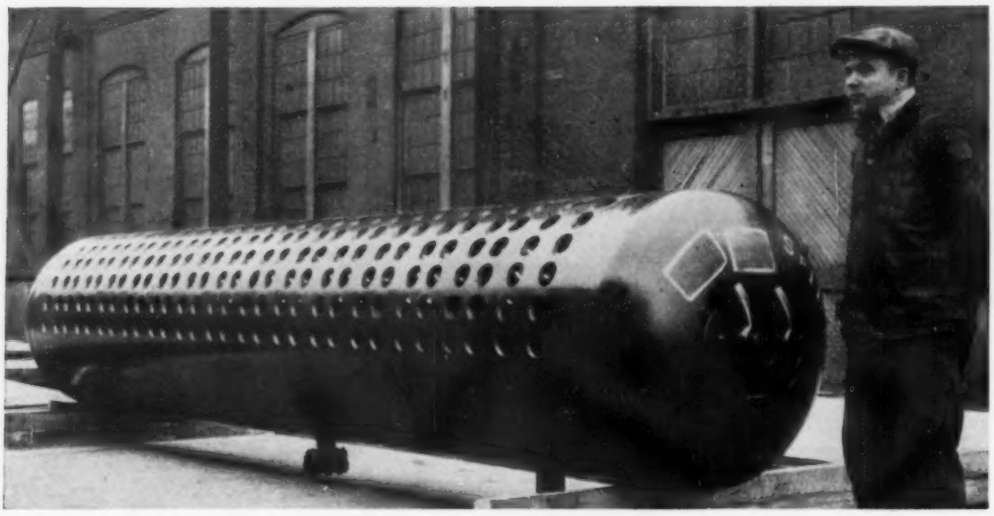
Requirements for material are very well covered in the new and old revisions of the A.S.M.E. boiler code. The highest grade steel is desirable. In general it is desired to limit the carbon content. The maximum carbon content permitted by the boiler code is 0.35 per cent.

Steel Plate of 0.20 Per Cent Carbon Recommended

Well-made steel is largely dependent for its physical properties on the amount of carbon in it, and this



WELDED storage tank of Smith-layer construction for Newport Chemical Corpn. is designed for storing hydrogen gas at 2000 lb. pressure (maximum working stress of about 15,000 lb. per sq. in.). Inside diameter is 19⅜ in. with total wall thickness of 15/16 in. and length of 33 ft.



ALL - WELDED boiler drum built for 207 lb. per sq. in. working pressure, by Babcock & Wilcox Co.

is the first thing to be considered in deciding what chemical analysis should be followed. Other things being equal, the higher the carbon, the more difficult is the welding and less satisfactory is the weld. Of course, the difference in welding qualities is not very great between 0.10 and 0.20 per cent carbon, but there is a marked difference between 0.20 and 0.30 per cent carbon. There is a corresponding difference in the physical properties, 0.15 per cent carbon having probably 50,000 lb. per sq. in. tensile strength, while 0.30 per cent carbon will have about 65,000 lb. These figures, of course, refer to plates of ordinary thickness made in the usual way.

Steel plate of not over 0.20 per cent carbon is therefore recommended because the lower the carbon the less injury is done to the steel by any method of heating or by hot or cold working. The lower the carbon the less the yield point, and a lower yield point allows the welding strains to be absorbed by the plate rather than concentrated in the weld. For plates of more than ¾ in. in thickness a slightly higher carbon content of 0.22 per cent is permissible. There is really no point in having a steel of high tensile strength if the welding wire is such that the weld produced therein has an average tensile strength of 50,000 lb. per sq. in.

Steel to be used in the welding of pressure vessels should be of good quality and free from impurities of various kinds. The quality is dependent on the care with which the steel was made. Impurities together with such defects as segregations and laminations may seriously affect the weldability of the plate. Steel is made in four usual qualities, firebox, flange, ship and tank. Of these firebox is the best. Therefore, for use in welded pressure vessels firebox plate of low-

NINE of the 24 drums built for the U. S. Navy's three new scout cruisers, by Babcock & Wilcox Co., for a working pressure of 320 lb. per sq. in.

carbon content, and consequently low strength, should be specified. A welded joint in this material, properly made and reinforced, will always be stronger than the plate material.

Welding Wires

The subject of welding wire has received a great deal of attention by welding engineers and others interested in welding. It is now generally recognized that a superior quality of welds, as regards ductility and tensile strength, may be obtained by the use of special covered or coated electrodes in arc welding, and special alloy wires in gas welding. There are several factors which make possible these superior welds as compared with those obtained with the average good quality welding wire on the market. Chief among these reasons are: (1) the use of fluxes which protect the molten metal from oxidation; (2) the incorporation of special alloys permitting greater strength and ductility; (3) the development of special technique. (The latter is covered in greater detail a little later.)

Formulas for the design of shells of vessels are generally well known. There is an increasing tendency to use the butt joint in all vessels of importance. In fact the A.S.M.E for the Class 1 or 2 vessels requires a double welded butt joint, that is, a joint welded from both sides. It is generally conceded that reinforcement is desirable. The accepted amount is about 20 per cent of the plate thickness on both sides of the joint. Care must be taken, however, to avoid ridges and valleys or sharp changes in contours, which may cause concentration of stress.

For plates of ¼ in. or more the author is of the opinion that longitudinal seams should be of the double V type, that is, welded from each side half way through the sheet. The double V is favored for hand operation as any irregularities will occur at the bottom of the V which in a double V joint is in the center. Improperly fused material may be chipped out before welding the V on the other side. However, a single V weld is permissible if the improperly fused material is chipped out from the inside and filled in with an additional layer of metal properly reinforced. In automatic machine welding the weld is deposited in one or more layers in a single V or U shaped groove. Sometimes a backing up strip is used to insure a perfect weld at the bottom of the V or U. Where this is not done the same precautions should be followed as in hand welding.

The use of the double fillet lap joint or the double fillet joggled lap joint is limited to plates not exceeding ⅜ in. Tests indicate that the load is probably unevenly distributed between the two fillet joints except where the plates are thin. The new rules of the A.S.M.E. permit the latter type of joint only for Class 3 vessels.

(To be concluded)

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WELDED STEEL PLATES HOUSE GENERATORS FOR RAILROAD ELECTRIFICATION

WELDED steel plate structures instead of buildings have been successfully developed for housing electric sub-stations by the Philadelphia Electric Co., in conjunction with United Engineers & Constructors, Inc., Philadelphia.

This departure from the conventional provides an appreciable saving in building costs and, according to the electric company, introduces no new or unusual maintenance problems. With such housing over the machines, a single-story and basement concrete building, 28 x 33 ft., adjacent to the housing, is sufficient to accommodate the control switchboards.

Houses Largest Converters

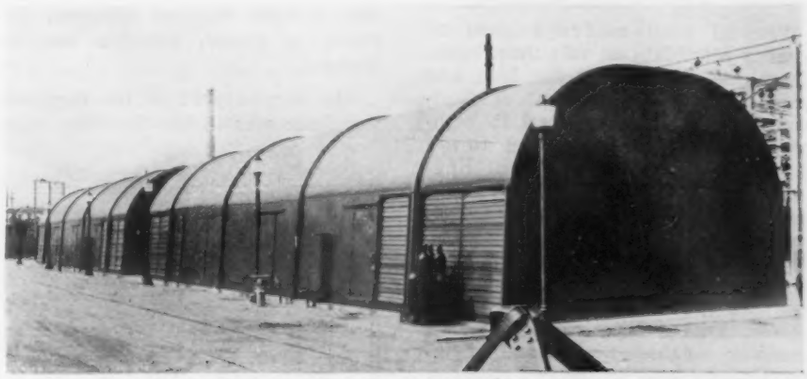
This method of covering has been successfully tested for 15,000-kw. frequency converters at the Wayne Junction substation of the company, built to serve the electrified section of the Reading Railroad. Now the Philadelphia Electric Co. has awarded a contract to the Bressler Metal Works Co., Lebanon, Pa., for a similar housing at the Richmond generating station, which is considerably larger. This station will convert electric energy from three phases, 60 cycles, to single phase, 25 cycles, for power supply on the electrified Washington-New York division of the Pennsylvania Railroad.

The converters, built by the General Electric Co., are said to be the largest ever assembled. The initial installation will consist of two General Electric 13.2-kv., 30,000-kw., synchronous frequency converter sets, with provision for six. Essentially motor generator sets, each consists of a 13.2-kv., 36,000-kva., three-phase motor, direct connected to a 13.2-kv., 30,000-kw., single-phase generator.

Covered with steel plate housing, each converter requires a foundation 42 x 72 ft. and a depth of 22 ft., necessary for proper bearing. Basement space provides for housing the motor starting equipment and miscellaneous switchboards, rheostats and air coolers. The complete installation requires about 240 tons of steel plates.

Because of the difference in pressure between the area within the housing and the basement, air locks are required. These permit egress from the interior, which is under positive pressure, so that there is no exchange of air or the necessity of exerting undue force to close doors against pressure, especially in an emergency.

The steel housings are divided into nine sections, each consisting of two



FABRICATED of ¼-in. welded steel plates, the Richmond substation of the Philadelphia Electric Co. will house a large installation of substation converters to serve the Washington-New York electrified division of the Pennsylvania Railroad. This view of the Wayne Junction substation of the company shows the type of steel plate housing being used.

fabricated I-section ribs, welded to a ¼-in. continuous steel plate shell and shaped to the contour of the machines, leaving sufficient operating space on all sides of the sets.

Each section is divided into three parts, spliced together, the lower two of which form the vertical sides and the upper one the roof sector. For ordinary maintenance, only the roof section is removed. These roof sectors, which are 9 x 36 ft. 3 in., are strong enough to permit handling with a crane and are equipped with lifting "eyes" for the purpose.

Sections Sealed with Rubber and Cork

Between sections are 1¼-in. openings, which, after assembly of the housing, are sealed by clamping bands, drawn against water-tight gaskets by bolts. Rubber gaskets are used for the joints, subject to more frequent use, and cork is utilized where removal is not ordinarily necessary.

Transfer of vibration from the generators to the housing is prevented by a 1-in. cork cushion at the junction of the housing and the foundation. Within are longitudinal and transverse hand trolley hoists for handling end bells and other minor parts of the equipment during inspection and regular maintenance.

Housings are secured to the foundations by tap bolts, so that the surface remains clear with no projections after removal of the housing parts. Individual sections are shop-welded throughout, so that no field welding is required.

Before painting, all sections are shot blasted to provide the most satisfactory bond. The exterior is painted battleship gray to match other equipment, and interior surfaces are white to give the maximum reflection from the lighting installation.

◆ ◆ ◆

British Test Steel Road in Tientsin, China

"Actual steel roadways seem at least a possibility at this time," says Joseph W. Palmer, of the Iron and Steel Division, Department of Commerce, in a report on steel in highway construction. In addition to experiments being carried on in England and Czechoslovakia, Mr. Palmer points out that "in Tientsin, China, there is a roadway consisting of a steel grid laid on a suitably reinforced concrete slab, filled with asphalt mixture until a smooth surface is attained. This is expected to provide a roadway capable of withstanding unusually hard wear as the test road has been laid as a part of the British Bund in that city, and the greater part of the traffic moves in springless, steel-tired, two-wheel carts."

ROTATING THE FORCE IN

◆ ◆ ◆

AN engineer in charge of the drafting and design department of a leading manufacturer of heavy power plant equipment has made a notable application of the rotation-of-jobs idea. His plan has now been tested by operation for more than a year, and in the difficult case of staggering work in design and drafting.

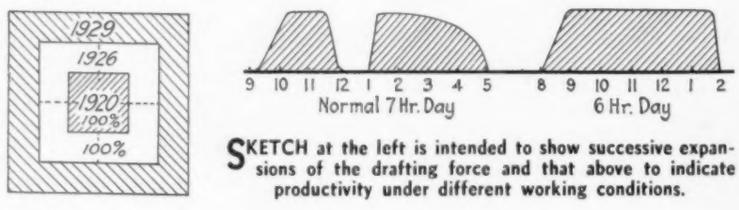
Along with other companies in this field of industry this manufacturer had experienced a greatly increased demand for its products in the boom year of 1929, owing to the large amount of power plant construction work then in progress. It was necessary, of course, to enlarge considerably the drafting force to handle a 100 per cent increase in business over 1926.

When the depression persisted the specific problem was how to retain the normal engineering force, comprising technical men of the most efficient type and of the widest experience with the company's products, against a volume of business so abnormally low that these men were not needed for full-time service. The company had required these men for some years and there was every reason to believe that it would need them to carry on after the depression ended. The old-fashioned method of dropping men until the size of the force and its payroll are in keeping with the business volume was not followed. Instead, as stated, rotation was attempted.

The largest part of the engineering force was in the drafting room. Here the organization had been built up with the squad as the unit. The inner square of the accompanying sketch represents the drafting force for such a year as 1920. But the work expanded by 1926 and the next larger square represents the new situation. The men in the 1920 force now held the key positions in the enlarged organization. While these added men were high-grade, experienced draftsmen and designers, they were unfamiliar with this company's products.

Business still continued to grow. During the boom period of 1929 it was necessary to increase the force further. This is shown by the large square. The men hired at this time were the most expensive to the company. In general they were of less experience and of a lower grade than those taken on in other years, as all companies were rushed with work and were not dropping experienced men; in fact, they were raising salaries to prevent withdrawals. Therefore salaries were high and the grade of men and the quality of their work lower than in normal times.

It was planned that if business contracted these last men would be the first to go. The company realized that there is no practicable way to stabilize engineering employment to include this outer, the floating group. But with the 1926 group, now the veritable foundation of the company, it was a different matter. In this highly trained engineering group the company had a heavy capital investment represented by the time required for



SKETCH at the left is intended to show successive expansions of the drafting force and that above to indicate productivity under different working conditions.

CE IN THE DRAFTING ROOM

By H. M. FRIEND

STAGGERING work in the design and drafting department has not been regarded as easy to do. In the case of a power plant equipment manufacturer the plan has been accomplished by alternating squads. When one completes a given task, another group gets the next job, and so the personnel needed for normal operations is kept attached to the company on an intermittent schedule. The deviser of the scheme is an advocate of a single continuous shift of 6 hr. for such workers, even in good times.

these men to become experienced in the company's products. It was estimated that a new man takes two weeks to become acclimated to his new surroundings, and four more to learn his work; moreover, when he receives his dismissal notice he is a part, if not a total, loss to the company for the two weeks terminating his employment. In other words, each man represents a capital investment to the company equal to at least his salary for two months.

There are also intangible advantages to the company in holding a man through a depression, as it retains his good-will. A man who is hired, dropped and rehired under the old methods of management is likely not to give the best in him, seeing how indefinite is his tenure of employment.

Referring again to the specific company, whose force is now back to the 1926 group and the volume of work down to the 1920 amount, the problem was how to retain this obviously unnecessarily large force. As drafting room costs are a part of production costs, this department must produce work for every hour paid for; not like departments which are strictly overhead, where the men are forced at times to sit around during a slack period. Yet the available work must be spread over the personnel of the department. In drafting and design work one cannot efficiently keep a man, say, Monday, Wednesday and Friday on one job and have another man handle the same drawings on the intervening days. For one thing, the second man would have to spend too much time to pick up where the other left off, even if otherwise the plan seemed feasible.

Instead, the chief draftsman assigns a man to a job until he completes it; then he lays this man off and puts another man on a new or different job. He requires every man laid off to telephone or call at the office once a week so that as soon as practicable he can place that man back on the next available job. This system is thoroughly explained to the men and has received their complete cooperation, but a close knowledge of the schedules is maintained to prevent any one man's unduly dragging out the time.

The plan keeps the designers alive to developments in design and manufacturing, which would not occur if they were absent from the organization for any length of time. Working even on part time permits the men to keep acquainted with improvements and thus remain essential elements of the force.

The engineer who developed this system regards the plan as largely one for the individual company, "as it must be tailored to fit each case. But the point of importance is," said he, "that it has been possible to work out such a system in the drafting room, a place where even a moderate degree of stabilization of employment was considered impossible."

This engineer believes the 8-hr. day now universal with an hour interval for luncheon is all wrong. He aims to establish a 6-hr. day, starting at 8 a. m. and ending at 2 p. m. The men would work right through with no time out for luncheon. In a small community where the time consumed in traveling to and from work is negligible, these hours could be 7 a. m. and 1 p. m.

An accompanying sketch covers his idea of the work curve. In the morning, of the present 8-hr. case, the curve starts flat as the man takes the first 15 minutes to get his instruments and drawing ready to begin work. Productivity then rises for an hour to its peak, on the score that it requires this amount of time before the man reaches maximum efficiency. As the lunch hour approaches, the curve falls off, the man, for example, thinking about where he will eat and about what point he will prepare to stop work. In the afternoon the curve takes a short period of time to reach its top level, and around 4 p. m. it drops off considerably, due to the fact that fatigue may be setting in, not to say there may be drowsiness resulting from a heavy lunch.

With the 6-hr. day in the drafting room, most of these causes of lower efficiency are eliminated. There is the usual rise in the morning and fall at the close of the day, but the intervening time is at maximum efficiency, and there should be little or no slowing up in the latter part of the period on account of fatigue.

The usual short working day on Saturday is another place where maximum efficiency is a relatively small fraction of the day's total activity, or rather a period where the lag in getting underway and the slow-up at the end of the period bulk large in the total day's work. This is so well known that when the working hours per week are reduced, this day is ordinarily eliminated.

By working 6 hr. a day for 6 days a week a total of 36 hr. is paid for, but the output is probably better than that of 37 hr. real work, under the usual schedule of 38½ or 39 hr. a week, comprising five 7-hr. days and 3½ or 4 hr. on Saturday.

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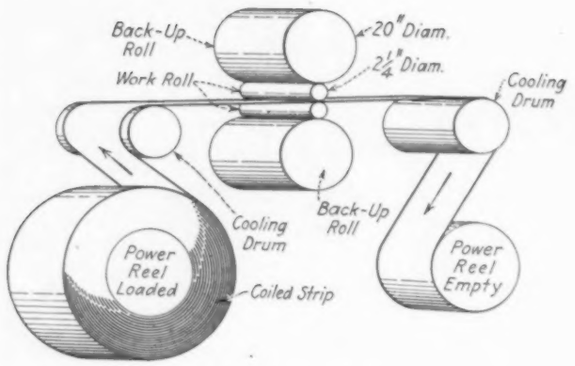


THE strip is drawn through the rolls first in one direction and then in the other and the alternations continued until the strip is reduced to the extent desired. Power is not applied to the rolls but to the strip by means of power reels, and the rolls of the working pair are notably small in diameter.

COLD ROLLING STRIPS BY THE STECKEL PROCESS

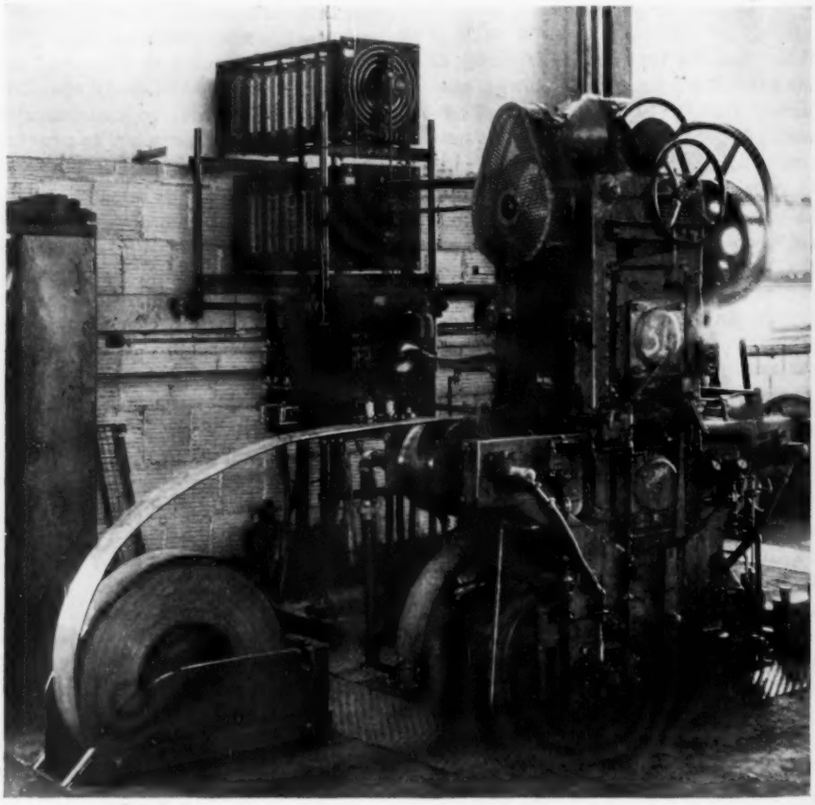
IT is not the purpose of this article to discuss the principles involved in the art of cold rolling metals, but to limit it to a description of the process developed by A. P. Steckel, and of the equipment employed in carrying on the process and the service in which it has thus far been applied.

Process Aims to Preserve Ductility

The primary object of the process is to preserve ductility in the strip being rolled. Mr. Steckel found that by using small rolls the material after each pass was more ductile than would be obtained by using rolls of ordinary size. The roll size which he desired was so small in diameter relative to length as to require support from a back-up roll. The back-up rolls employed are sufficiently large that adequate roller bearings for the carrying of the rolling pressures may be used. For similar reductions this would be practically impossible in cold mills of the two-high type because of the roll pressures which exist.

Mill friction will thus, with small work rolls, be reduced to such insignificant proportions that the mill may be driven by drawing the material through the rolls. This does away with much driving mechanism, simplifies operation and insures the straightness of the product. Driving by this method would not be possible with ordinary bearings for the starting friction would tear the material and the mill would not run even if started, except on very light drafts which would be wasteful of time. Drafts equal to and sometimes greater than those commonly taken in regular practice are emphasized as the rule in this process.

Since the power for the mill is supplied by drawing the material through the rolls, a strong tension is maintained on the delivery side of the material, thus insuring the straightness of the product. The thinner the material the more necessary it becomes to apply high and even tension. This involves careful adjustment of the reeling mechanism, which adjustment varies with gage and width and hardness of the material. However, when the tension in the material furnishes the motive power of the mill there is no necessity for such adjustment, as the tension is proportional to the draft being taken. There is therefore nothing to adjust but the draft, which must be done before each pass in any event. Under some conditions of rolling there may be occasion for extra tension, in which case it is obtained by applying back tension to the material on the entering side of the mill.



7½-in. Steckel mill with coil in place for loading the mill. In the front may be seen the water connections by which the drums carrying the strip on the way to the rolls, one on each side of the mill, may be cooled.

FEATURES EMPHASIZED

SMALL working rolls preserve ductility

They go toward making the cold rolling a reduction rather than a finishing process

Backing-up rolls provide well for anti-friction mounting

Mill is driven by drawing material through the rolls

A strong tension, with its straightening effect, is maintained on delivery side

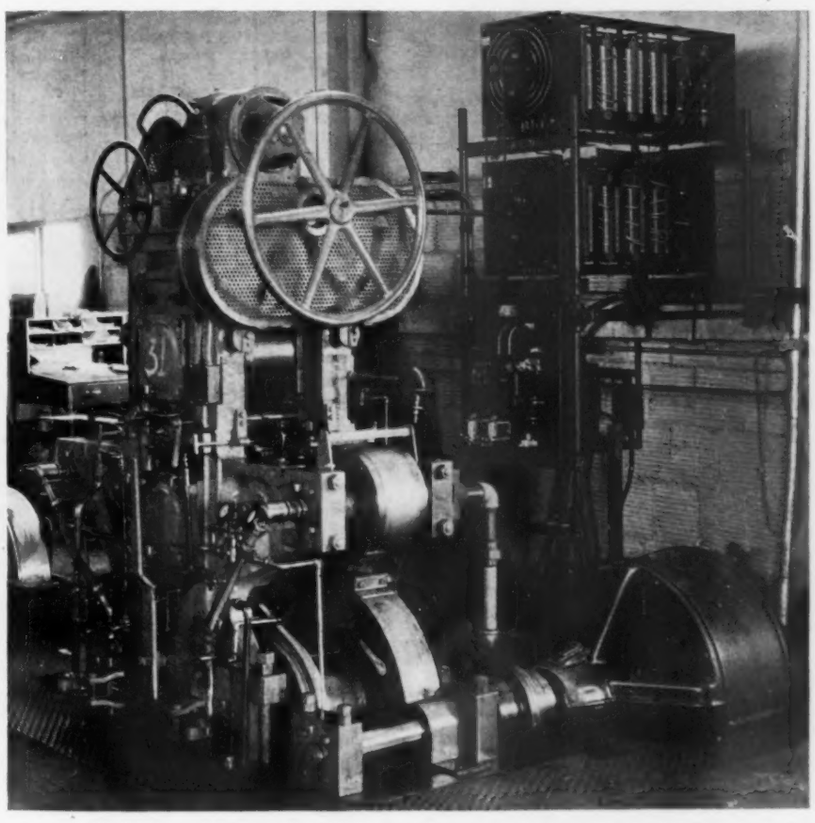
Material is claimed to have no center crown and to be extremely accurate to gage

Among advantages listed are: No surface decarbonization; freedom from process pickle embrittlement; absence of edge cracking.

Cold rolling had heretofore been primarily a method of giving a high finish to hot rolled sheets and strip, the reduction being incidental and determined by the minimum amount of cold rolling necessary to give the required degree of perfection of finish. It has now been converted into a cheap reduction process, for the anti-friction mounting of the back-up rolls permits of the strip being rolled at high speed.

The inherent result claimed for this process is a new product having numerous advantages over metals rolled by the processes previously practiced. Among these advantages may be mentioned the fact that the metal is flat and has no center crown, as usually present, thus giving more footage of strip per pound of weight. There is no surface decarbonization, there is freedom from process pickle embrittlement, absence of edge cracking, hardness without loss of all ductility, higher and better physical properties, lower annealing cost and extreme accuracy of gage throughout the entire length and across the strip.

This property makes every foot of the strip thus available for the order on which it was rolled. It further practically eliminates sorting and reduces the cost of inspection to a minimum. Inventory in process is reduced due to the elimination of intermediate annealing.



Drive of the reels, as here shown for the 7½-in. mill, is by electric motor using the Ward-Leonard system of speed control, all located behind the mill.

General Arrangement of Mill

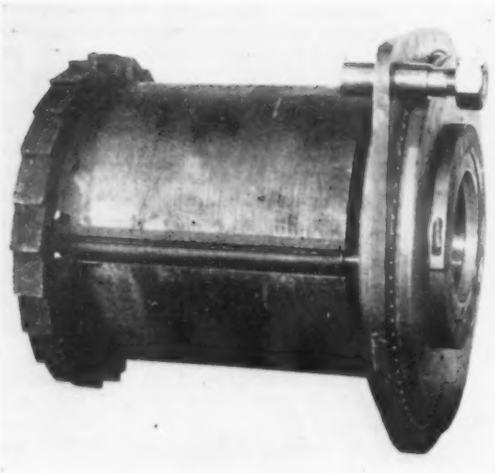
The arrangement of the essential moving parts of a Steckel mill may readily be seen by reference to the accompanying diagrammatic sketch and the reproductions of photographs of a 7½-in. mill at the works of the Cold Metal Process Co. at Youngstown. The power reels are fitted with internal roller bearings. These reels are free to turn on gear shafts on which they are mounted. A pinion, cut integral with a shaft and direct connected with the motor, engages one of the gears which in turn engages the other gear, causing it to revolve in the opposite direction. By connecting one or the other of the power reels with its respective gear, the strip may be drawn, first on to the right hand reel, as shown in the diagram, and, upon completion of that pass, in the reverse direction on to the then empty left hand reel.

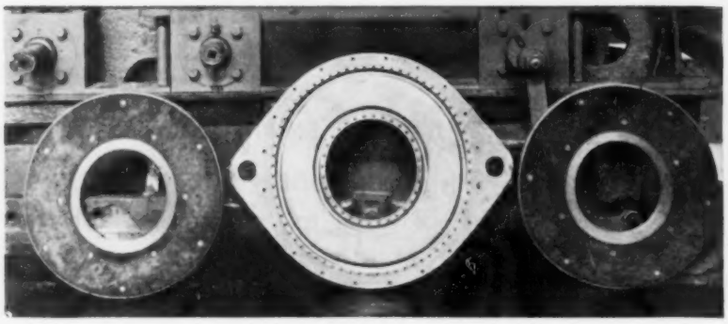
The connection of gears and reels is effected by means of a ratchet wheel, which forms a part of the reel, and an engaging pawl, carried by and under the overhanging rim of each gear. By the movement of a pawl shifting lever, which may be seen directly in front of the mill, the operator may apply power to either one of the reels as desired. The path of the strip from the loaded power reel to the first cooling drum, thence to the work rolls where reduction takes place, over the second cooling drum and on to the empty reel to which power is then being applied is apparent in the sketch.

Steckel Mill Details

The general structure of the Steckel mill is obvious from the illustrations which accompany this article, so that attention will be confined to a description of the essential details, which, in important respects, differ from those most nearly corresponding to them in ordinary cold rolling mills.

Bearings.—Full use has been made in the Steckel mill of the anti-friction principle on which it is based to attain the highest rate of production possible by a proper combination of drafts and speed. Combined with the anti-friction properties resulting from the lower pressures possible with small rolls is their relative inelasticity compared with larger rolls. This is important, for it enables the small roll to level off irregularities in the gage of hot rolled strip so that a





ONE of the two reels on which the strip is wound and unwound on each pass. It is equipped with ratchet driving rim, gripper for taking the end of the strip and a brake for applying back tension as needed on the entering side of the mill. The central part of the brake (shown prior to assembly) is a water chamber contained by flexible stainless steel diaphragms; these press against the two asbestos-faced rings in proportion to the amount of the water pressure.

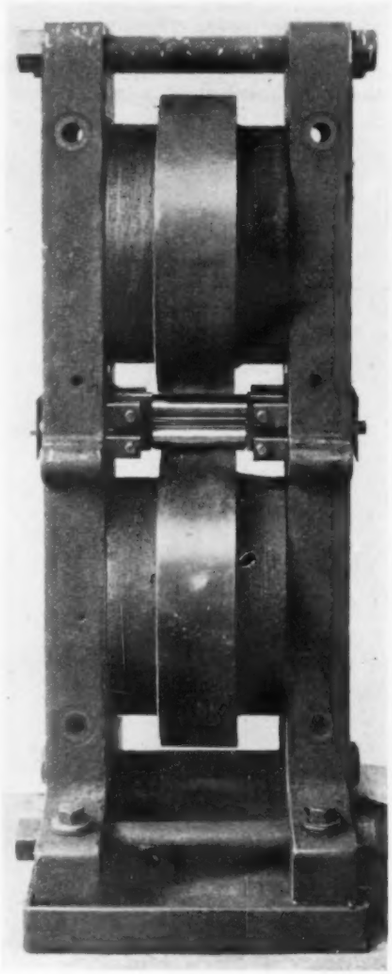
product of great and uniform precision is obtained.

In order that this property shall in no way be nullified by any inaccuracies in the back-up roll bearings, only those of a very high order and great surplus capacity have been employed. Rollers for these bearings are selected by careful tests for uniformity of size and both inner and outer races are ground to secure practically perfect concentricity. Roller bearings are used elsewhere throughout the mill with the exception of the bearings which maintain the work rolls in position. These are plain babbitted bearings provided with flood lubrication and are required to take only the pressure due to strip pull. Ball bearings take care of any end thrust that may result from any error due to wear or slight misalinement of the work roll. The practice in the case of all bearings is to equip the mill with those that have a capacity at their respective maximum speed of about three times the actual maximum load to which they will ever be subjected. This is equivalent to saying that barring accidents and neglect of lubrication the bearings should last forever.

Rolls.—The rigidity of bearings, on which such emphasis has been laid in the design of Steckel mills, has been extended to the selection of rolls. The bodies and necks of these rolls are made of sufficient size so that their combined deflection is almost negligible. The low pressure of rolling inherent in the use of small work rolls helps materially in this reduction of deflection.

The back-up or supporting rolls are generally made of specially hard heat-treated steel. The work rolls are made of high-speed tool steel with all surfaces ground and an exceptionally high finish given to the body surface, since this determines the character of finish given to the product. To restore the finish it is only necessary usually to grind off about 0.0015 in. and as over ¼ to ½ in. may be removed before rolls must be replaced the cost of roll renewal is very low.

The size of work roll is determined, in the case of the Steckel drawing mill, by the deflection due to strip pull which it is considered desirable to allow and not, as in the case of driven mills, by the size of roll neck to transmit the torque required to effect a given reduction. The size of a work roll for a Steckel mill to roll 24 in. wide would be 3½ in. diameter against 10 in. diameter rolls with 6-in. necks for a driven mill, if taking the same reduction.



Original Steckel mill

Housings.—In line with the idea of maintaining extreme rigidity and thereby assuring a product of uniform gage throughout its entire length, the mill housings are made of cast steel having posts of ample section, so that the unit stress under maximum conditions rarely exceeds 1000 lb. per sq. in. The importance of the effect of the use of small rolls in reducing roll pressure which the housings must finally carry is particularly stressed; in the example mentioned, of 3½-in. rolls compared with the minimum of 10 in. used on a driven mill, it is reduced as much as one-half. With 2¼-in. rolls taking 10 per cent reduction on low carbon steel, roll pressures as low as 5000 lb. per in. of strip width have been observed.

Reels.—The construction of the reels on which the strip is wound and unwound on each pass is indicated in one of the illustrations. It is fully equipped with ratchet driving rim, gripper for taking hold of strip end and brakes for applying any desired back tension on the entering side of the mill.

In mills suitable for rolling up to 20 in. in width, the reels are equipped with internal roller bearings and are arranged to revolve on the gear shaft as shown and explained in a previous paragraph. For larger mills the practice tends toward mounting the reel on external bearings with shaft extensions for driving the reel by some form of coupling or direct connection to a reversing motor. The 38-in. mill is equipped with reels that may be removed from the mill upon completion of the last pass, carrying with it the finished coil. This reel is then immediately replaced by an empty reel. The 26-in. mill, also shown, has reels in fixed bearings and the reel shaft extensions, on one side of the mill, are arranged to attach back tension brakes of either the dynamic or friction type as desired.

The device for securing the end strip to the reel consists of a roller between two hardened steel plates or

jaws fitted in a radially tapered slot in the body of the reel. Springs back of the roller keep it pressed outward and in contact with both jaws. The slightest tendency of the end of a strip to move outward after it has been inserted between the roller and one of the jaws causes the roller to roll and grip the strip still more tightly. When the end of strip is to be removed a slight blow on the roller is sufficient to cause the roller to release its grip. In some cases the same result is accomplished by turning the roller with a wrench applied to a square on its end projecting beyond the body of the reel.

Back tension is necessary in rolling strip on Steckel mills. For this purpose it has been found that a water-cooled type of brake is very satisfactory, especially in the form shown. In this form of brake the central stationary member consists of an inner and outer ring to which there are attached two flexible stainless steel diaphragms. In the space between these diaphragms water is made to circulate and carry away the heat generated by the friction of the diaphragms against the asbestos faced rings. These rings are attached to a hub of the reel and revolve with it. The desired amount of back tension is obtained by regulation of the water pressure maintained between the diaphragms, the amount of water thus flowing being sufficient always to keep the temperature of parts within safe limits. No lubrication is used between the rubbing surfaces, and it has been found that brakes so constructed do not necessitate any increase in pull on the strip at the start of a pass over that which it is desired to maintain during the pass. Breakage of strip due to excessive pull at start of the pass is thus obviated.

Back tension, alluded to as desirable in rolling, is also important for another purpose. It assures sufficient friction between the strip and the cooling drum, so that no slip may occur and prevent the speed of the cooling drum surface from being the same as the strip speed.

Cooling Drums.—To insure that the strip entering and leaving the work rolls be without the added stresses due to bending at the roll, it is customary to place the upper surface of these drums in the plane of the upper surface of the lower work roll; thus the guides are relieved of any excessive pressure to which they would otherwise be subjected. They therefore play a part in guiding the strip as well as cooling it while in contact on both sides of the mill. To accomplish the cooling the outer barrel of the cooling drum is internally cooled by water, which enters and leaves the drum through passages drilled in the shafts on which the drums are mounted. The arrangements for the control of the water to the drums may be seen in a view of the 7½-in. mill.

Drive.—The most satisfactory system of drive for Steckel mills so far developed is by electric motor using the Ward-Leonard system of speed control, by varying voltages up to base speed and further increase in speed by field weakening. With such an arrangement the strip speed may be varied from a barely perceptible creep to speeds that may eventually exceed 1600 ft. per min.

Usually the mill is driven, through gearing, by a single motor. This may be a non-reversing motor when arranged as in the case of the 7½-in. mill, or reversing when the arrangement is such as to place the pinion be-

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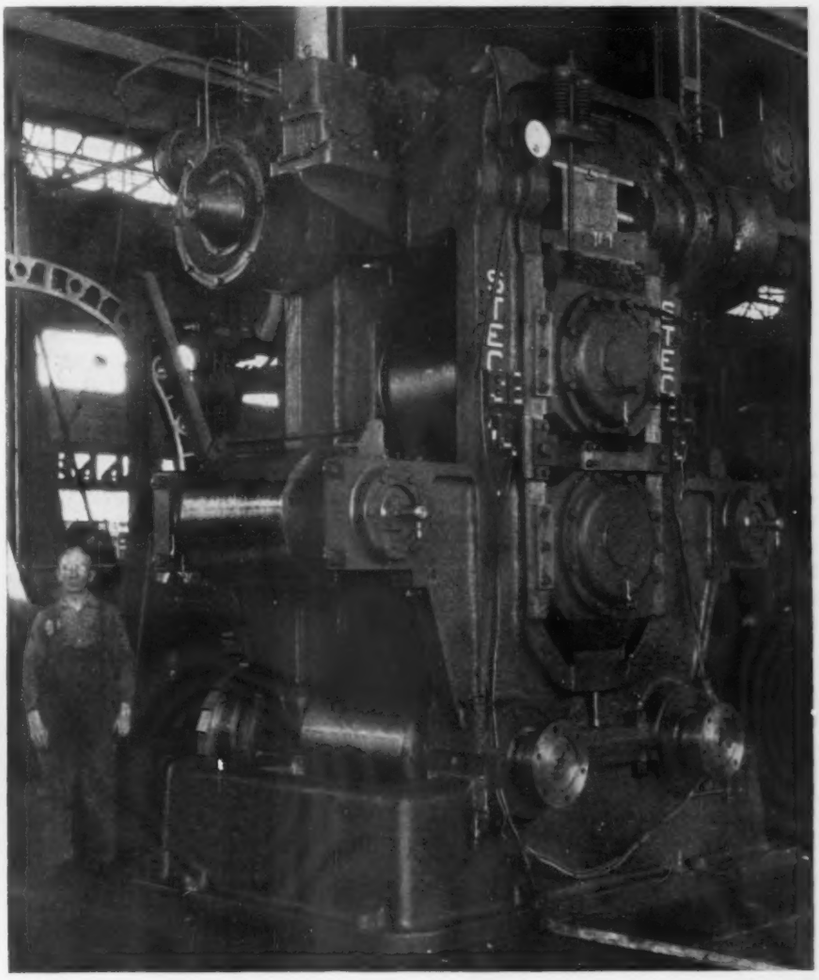
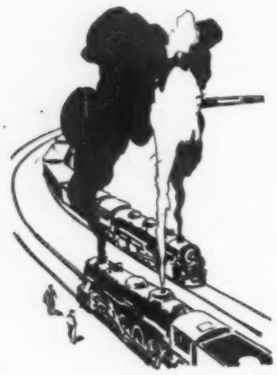
THE 26-in. mill has reels in fixed bearings, and the reel shaft extensions are arranged to attach back-tension brakes of either the dynamic or friction type.



SELECTING ALLOY STEELS FOR LOCOMOTIVE FRAMES



By W. A. NEWMAN AND C. F. PASCOE
Mechanical Engineer,
Canadian Pacific Railway,
and Superintendent, Canadian Steel Foundries, Inc., Respectively,
Montreal, Canada

IN THE IRON AGE of March 10, 1927, there appeared an article outlining a preliminary investigation of the possibilities of special grades of alloy steels for locomotive frames. This article concluded by stating that it was the intention to make still further investigations of the merits of various combinations of alloying elements commonly used in the production of steels.

Object of the Investigation

The reason for this investigation was that core drill tests taken from an ordinary commercial run of steel frames indicated that, to a certain extent, the heat treatment was more or less superficial and the results obtained from coupon tests only applied to a definite depth below the surface. The object was to find, if possible, a grade of steel suitable for use as locomotive frames that would possess uniform properties throughout the entire cross-sections, which vary in dimensions up to a maximum of 6 by 16 in. Both from previous tests made on commercially produced frames, also from results obtained on forging materials, it was assumed that low-carbon steels would give the most uniform results and this was taken into account in selecting the grades of alloy steels that would be produced for test.

To obtain the desired large cross-sectional bars of steel from which to secure the test specimens for investigation, it was decided to cast integral, with full-size locomotive frames, bars 6 in. by 6 in. by 2 ft. long, these being sufficient to obtain all the specimens from various positions throughout the section. It should be noted that the steels were not laboratory casts but were full-size melts put through the foundry in the usual way. A pair of locomotive frames was cast of each grade of alloy steel so that the test bars were actually representative of ordinary foundry production.

Ten Grades of Steel Cast as Frames

After a study of the subject, it was decided to produce frames of straight carbon steel, nickel steel, vanadium steel, molybdenum steel and combinations of nickel-vanadium and nickel-molybdenum. In all, ten pairs of frames were cast, the same combination of alloys being used in some cases but with different percentages of carbon. It is considered undesirable to give the exact analysis of each of the test runs and for identification the various steels are designated as Grades A, B, C, D, E, F, G, H, I and J.

Fig. 1 shows diagrammatically the test bar as cast with the frames and the various ways in which specimens were selected to explore the strength of the steels throughout the cross-section. The method of selecting the test pieces is graphically shown.

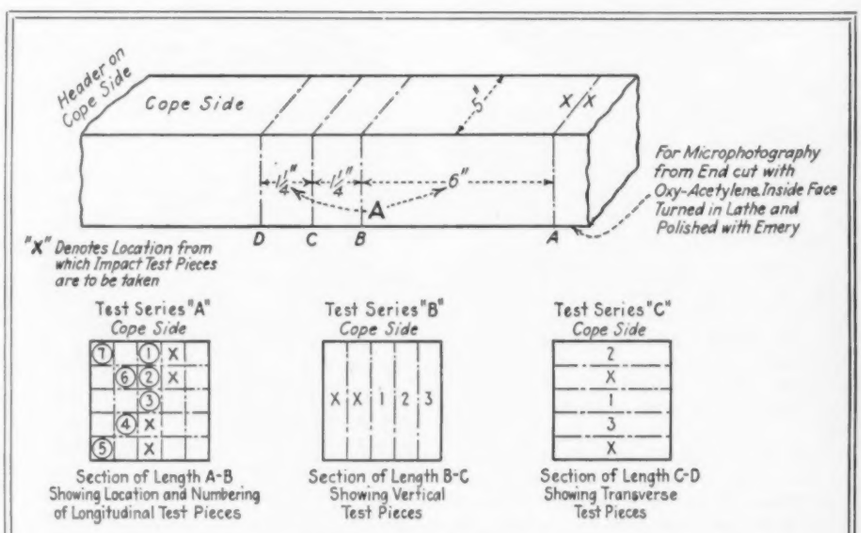
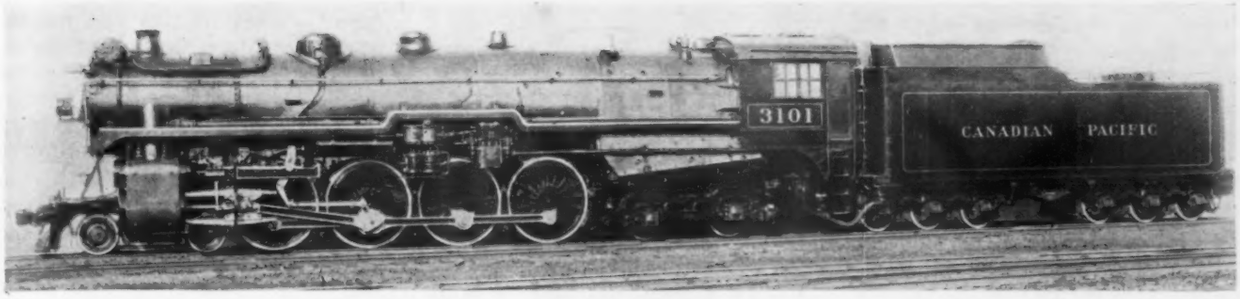


Fig. 1.—Diagrammatic plan showing method of selecting test bars of the ten alloy steel heats.



TO meet a demand for stronger steels in locomotive frames, an extensive investigation of ten different alloy steels heats was made by the authors. Not only greater strength and elastic limit were sought but also higher impact values. Large test bars were used as more representative of the material than the customary small attached bar. The heat treatment used in each case was the double anneal. The result was the selection of a low-carbon, 2 per cent nickel steel with moderately high manganese.

In a later article the effects of oxyacetylene and electric welding on the steels will be discussed.

Three different series of specimens are provided for and are designated respectively as A, B and C, as referring to the different locations in the test bar. The attached numbers indicate the position in the bar in accordance with Fig. 1. Not only was a set of test coupons secured for physical tests but an additional set was provided for impact tests, the impact results being secured with a Tinius Olsen 100 ft.-lb. impact machine, type 120 D.

In addition to these tests, there was one further specimen secured and tested which has been designated as C-R. This was a transverse piece from a 1⅛-in. riser head which was located on the top of section C-D.

Double Heat Treatment Applied

After casting, the frames and test bars were all given the same heat treatment, which consisted of:

1.—Heating to 1800 deg. F. for 2 hr. per inch of cross-section, and cooling in air.

2.—Heating to 1450 deg. F. for 1½ hr. per inch of cross-section, cooling in air.

Subsequent to the heat treatment, the specimens were cut from the bars and tests made at the testing laboratory of the Canadian Pacific Railway Co. at the Angus Shops, Montreal. Table I gives the results of the tension tests secured, the column on the left side giving the physical properties of the test coupons attached to the frame in the ordinary way and the succeeding columns the results from the test specimens taken from the various locations in the test bars as referred to above.

The results secured were very interesting. It may be stated that all the test bars showed signs of secondary piping at or about the center of the cross-section, which was clearly seen in the photomacrographs. For this reason the majority of the frames gave very low physical properties for test specimen A-3 but because this is so close to the center of the cross-section, it was not considered that the inferior results obtained at this point should be considered as important. Of course, it is desirable to secure an absolutely uniform strength if possible, but it is appreciated that this is entirely a question of foundry practice.

Most of the different grades of steel showed considerable variation, some of them even showing the poorest results at the surface, where the best results might have been expected. It will be noted by a comparison of the results given in Table I that Grades A, B, D, G and H gave the most uniform results and for comparative purposes it may be stated that Grade B was a straight carbon steel of 0.23 per cent carbon content.

Before commenting upon the physical properties of these various grades, however, it would be as well to study the results given in Table II, which shows the impact values obtained throughout the various sections. For the sake of ready comparison, the averages secured, as shown in Table II, have also been in-

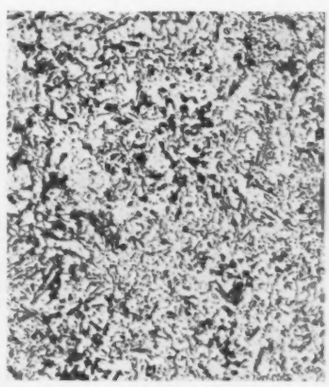


FIG. 2. (above)—Photomicrograph of 2 per cent nickel alloy steel selected as having the most suitable properties. 100 diameters.
Fig. 3.—Same as Fig. 2 at 2000 diameters. (At left.)

dicated at the extreme right in Table I.

The mild steel casting, Grade B, gave extremely uniform results and the average is comparable with the results secured from the test coupon. The yield point, however, is low as compared with alloy steels and, as the design of frames has been based more upon the standpoint of yield point or elastic limit, it is not felt that mild steel has sufficient elastic strength for the work for which it is intended.

Various Types Compared

Grade A steel showed a considerable falling away in the ductile properties as compared with the test coupon but gave an even higher average tensile strength and elastic limit than that secured from the test coupon. The impact value, however, was very little better than straight mild

steel. In Grade D the average ductile properties were good but the yield point and impact values were low.

Grade G showed a considerable falling off in ductile properties but the averages were good. The tensile strength and yield point were slightly lower than that obtained from the test coupon. The average impact value was extremely high, and it will be noted from Table II that the impact strength of this steel was remarkably uniform throughout the entire cross-section. For Grade H the ductile properties were fairly low but the tensile strength and yield point were good; the impact value, however, was low.

From all these results it was concluded that Grade G possessed the most merit for the purpose intended, that is, locomotive frames where an extremely tough material is required with a high resistance to impact. For this grade the elongation and reduction of area may be considered about on a par to both mild steel and Grade A. The uniform impact value is much superior to any other grade of steel and the yield point ample for the purpose intended. This particular steel is a low-carbon steel with moderately low manganese and a minimum of 2 per cent nickel and this is the grade of material that has been

Table I.—Tension Tests on Cast Steel Frames

Steel "A"	Coupon	A.1	A.2	A.3	A.4	A.5	A.6	A.7	B.1	B.2	B.3	C.1	C.2	C.3	C.R.
Tens. Str.....	79,640	81,675	86,895	85,470	85,370	84,775	90,115	86,720	83,960	84,525	86,670	83,925	85,070	84,025	84,260
Yield Pt.....	53,225	56,915	53,225	54,970	52,670	55,665	57,365	55,865	53,175	54,770	55,965	55,665	55,865	55,815	56,020
Elg. in 2 in...	34.00	8.00	10.00	18.00	27.50	33.00	18.00	29.50	28.00	26.50	25.50	26.00	27.00	28.50	25.50
R. of area...	63.43	13.73	12.86	27.16	48.03	58.46	31.80	57.31	51.62	43.68	41.89	43.98	48.88	51.67	51.62
Steel "B"															
Tens. Str.....	74,390	73,790	75,035	72,840	70,145	71,840	74,940	73,690	68,770	69,795	73,690	69,395	67,550	69,745	71,645
Yield Pt.....	38,590	38,540	38,245	36 545	36,795	37,195	37,695	36,295	35,390	34,900	37,445	35,895	36,395	36,145	36,945
Elg. in 2 in...	34.00	32.00	20.25	24.50	31.00	34.75	31.25	33.25	25.25	25.00	27.00	31.50	28.00	33.00	15.50
R. of area...	57.06	39.49	31.15	38.84	40.40	55.32	47.63	56.12	36.24	35.70	48.78	50.87	43.68	49.18	21.67
Steel "C"															
Tens. Str.....	117,925	95,005	94,760	92,010	92,110	100,650	85,770	104,395	91,760	87,420	105,340	93,210	107,040	81,180	107,240
Yield Pt.....	76,985	69,345	69,095	68,050	67,300	69,045	70,445	72,290	66,550	67,650	69,295	67,700	70,045	66,300	69,840
Elg. in 2 in...	20.00	4.00	3.00	4.50	6.00	24.50	2.00	24.00	4.50	3.50	22.50	3.00	8.75	2.00	10.50
R. of area...	43.23	3.74	2.75	7.39	9.49	50.87	2.75	50.17	5.84	4.49	44.88	3.34	11.53	3.94	13.38
Steel "D"															
Tens. Str.....	75,290	71,395	65,815	69,900	71,295	72,290	73,090	72,340	71,395	72,090	74,040	72,240	72,090	71,490	73,390
Yield Pt.....	47,770	40,240	.....	38,490	38,890	38,740	39,540	38,690	38,590	37,945	40,840	39,590	40,890	38,740	39,940
Elg. in 2 in...	32.50	16.00	7.50	16.50	31.00	32.00	13.00	31.50	30.25	31.00	30.75	30.50	32.00	27.00	32.00
R. of area...	62.76	28.50	18.00	29.35	54.12	60.10	22.86	57.71	52.77	52.67	48.88	54.12	54.92	51.82	56.76
Steel "E"															
Tens. Str.....	94,310	92,710	69,245	78,830	63,955	91,660	82,575	92,460	83,725	86,920	91,165	84,575	86,720	82,275	87,870
Yield Pt.....	64,055	63,755	60,860	58,960	55,365	66,300	61,905	67,200	57,015	58,760	62,955	56,865	58,265	59,510	60,610
Elg. in 2 in...	26.00	22.00	3.50	6.25	2.50	28.00	7.50	28.00	12.50	24.75	29.00	26.00	17.50	10.50	20.50
R. of area...	54.91	43.24	5.64	14.68	14.47	62.06	19.52	61.60	24.76	41.58	60.20	49.03	30.15	30.15	33.45
Steel "F"															
Tens. Str.....	100,200	102,095	66,800	86,470	98,195	101,200	63,455	104,345	75,185	100,600	105,990	83,075	92,360	100,650	100,050
Yield Pt.....	63,560	75,135	.....	65,350	65,715	72,890	60,710	70,995	68,445	70,595	75,385	70,495	72,990	70,145	71,145
Elg. in 2 in...	25.00	8.50	3.00	6.50	11.50	24.50	2.00	18.00	2.00	17.00	21.00	5.50	5.50	16.00	11.00
R. of area...	54.73	13.58	8.14	11.88	13.58	48.33	3.34	32.80	8.89	23.41	43.68	13.73	12.08	25.61	21.67
Steel "G"															
Tens. Str.....	69,045	69,395	44,310	65,150	68,820	68,300	70,195	68,000	68,000	69,345	69,945	68,995	68,795	67,200	68,445
Yield Pt.....	50,625	49,225	.....	43,185	47,420	50,925	48,280	50,025	46,730	46,730	48,925	47,980	43,985	46,980	48,725
Elg. in 2 in...	38.00	21.50	2.00	12.50	21.50	36.75	27.50	36.50	30.00	23.00	35.00	29.50	31.50	16.00	31.50
R. of area...	66.70	25.61	11.18	26.31	23.76	66.10	31.50	63.16	41.59	35.05	52.37	45.73	58.86	24.06	60.11
Steel "H"															
Tens. Str.....	88,515	75,085	52,220	77,585	79,680	81,430	82,175	82,975	77,135	78,480	82,025	77,385	78,680	78,945	77,735
Yield Pt.....	57,765	50,475	48,180	47,930	50,575	53,170	51,820	51,025	46,580	47,030	52,470	47,680	46,980	49,275	47,430
Elg. in 2 in...	27.50	8.50	2.50	15.00	24.00	30.50	13.50	28.50	26.50	28.00	28.50	23.50	25.50	26.00	25.00
R. of area...	59.96	16.67	5.09	21.47	36.65	58.06	29.01	55.87	48.63	48.63	48.63	38.99	38.04	51.23	46.63
Steel "I"															
Tens. Str.....	94,310	92,410	78,880	74,740	55,665	91,960	61,260	93,505	83,425	86,970	92,260	83,325	88,815	87,170	85,620
Yield Pt.....	64,005	63,605	61,955	58,660	.....	64,405	.....	66,150	57,265	60,010	65,500	58,360	59,900	59,260	59,460
Elg. in 2 in...	27.50	26.50	5.00	6.00	2.50	27.50	1.50	27.50	13.00	14.50	27.00	11.00	22.00	14.50	10.00
R. of area...	59.36	54.12	21.12	10.38	6.24	61.21	4.89	58.46	29.16	26.46	57.81	24.41	33.10	21.47	23.76
Steel "J"															
Tens. Str.....	87,170	74,840	57,615	72,140	81,875	84,625	81,530	84,725	76,985	80,530	85,570	61,160	83,225	80,930	79,980
Yield Pt.....	56,965	53,970	47,430	47,030	47,280	49,675	50,975	52,920	47,430	47,530	51,475	51,575	49,475	47,680	45,730
Elg. in 2 in...	30.00	5.00	2.00	9.00	14.50	32.00	8.00	31.50	10.00	10.00	31.50	6.50	25.50	11.00	17.00
R. of area...	61.36	13.38	3.34	19.52	19.87	62.81	17.37	64.45	24.06	23.07	58.06	18.47	46.88	18.82	23.22

"A"—Longitudinal pieces from section A.B.
"B"—Vertical pieces from section B.C.
"C"—Transverse pieces from section C.D.
"C. R."—Transverse pieces from 1-1¾ 8 in. riser head on top of section C.D.
Note: Tensile strength and yield point are given in pounds per square inch with elongation and reduction of area in percentages. Average impact values are as follows: Steel A, 31.6; B, 29.5; C, 9.5; D, 32.5; E, 42.6; F, 28.4; G, 60.2; H, 26.2; I, 34.7; J, 33.9.

Table II.—Izod Impact Tests (Olsen)

	Steel A	Steel B	Steel C	Steel D	Steel E	Steel F	Steel G	Steel H	Steel I	Steel J
AX.1	27.4	29.8	9.4	31.4	39.7	26.6	55.0	23.2	27.4	36.3
AX.2	25.0	26.8	9.0	27.0	34.7	22.2	52.4	18.8	26.0	30.0
AX.3	29.5	32.0	9 2	31.4	42.5	33.4	59.2	23.4	33.4	30.3
AX.4	30.4	30.0	13.7	33.8	50.3	22.2	68.4	26.6	37.2	34.3
BX.1	31.0	28.7	8.0	27.0	40.6	32.5	59.0	27.7	31.5	33.4
BX.2	35.0	25.2	9.0	37.2	41.5	38.6	50.0	27.5	40.3	31.8
CX.1	36.1	33.0	4.0	33.3	47.0	26.5	63.5	33.0	41.7	36.8
CX.2	38.5	30.4	14.0	38.6	44.8	27.3	65.0	28.6	40.4	38.3
Average	31.6	29.5	9.5	32.5	42.6	28.4	60.2	26.1	34.7	33.9

AX.1.—At cope face of section A.B.
AX.2.—Below AX1.
AX.3.—Above AX.4.
AX.4.—Center of drag face, section A.B.
BX.1.—At vertical face, section B.C.
BX.2.—Inside of BX.1.
CX.1.—From cope part of section C.D.
CX.2.—From drag face of section C.D.

used consistently since the date of the original experiments.

There have, however, been some slight modifications in order to obtain a higher tensile strength and yield point, the manganese having been raised and the carbon increased slightly. The addition of both these elements results in the loss of some resistance to impact and it is debatable as to whether or not it is desirable to sacrifice impact strength for tensile strength and yield point. In fact, because both carbon and manganese increase the tendency of steels to harden under various methods of welding, a more serviceable and foolproof steel is secured if both carbon and manganese are kept as low as possible, even at the expense of a slight reduction in ultimate strength and yield point.

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Research Should Be Sustained Through Good Times and Bad

A MANUFACTURER might better cancel his fire insurance than drop his only insurance against retrogression (research), said Dr. L. V. Redman, vice-president, Bakelite Corpn., Bloomfield, N. J., in an address on "Research as a Fixed Charge," at a meeting of the chemical societies of the New York area.

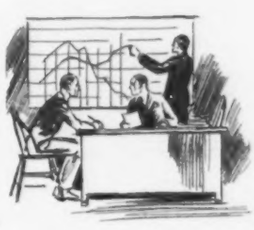
"In every well conducted business," he added, "there are certain charges that have long been considered as inescapable. Included are interest on borrowed capital, rents, taxes, insurance, depreciation, obsolescence. It is time, in this industrial age, that there be added to these fixed charges a charge for an adequate and sustained program of research, without which no industry can progress, if indeed it can long survive.

"Our more progressive industries are endeavoring to maintain a consistent research program, but it has not yet acquired the status of an obligation of sound management in the minds of many of those who are in control of business finance. More often in the past has research been thought of as a luxury to be indulged during a period of large profits and renounced when dividends can no longer be maintained.

"Gradually we are realizing that research is a necessity for good times and for bad times alike; a necessity in good times to provide full employment for willing capital and greater return for labor; a necessity in bad times, as has been recently so well set forth by Dr. Charles F. Kettering, president, General Motors Research Laboratories, to tempt forth from hiding the reluctant, hoarded dollar.

"It is an accepted, if somewhat new, tenet of the economist that not only is there at all times a limit to the consumption of necessities, but when the nation is saving it is only the new things, not the commonplace, that open wider the purse, or tempt hoarded money from its hiding.

"There is indeed wisdom on the side of the management that feeds out the results of successful research and development at a rate that will insure reasonable continuity of output. There is added wisdom in seeing to it that not the least attractive of the new things are those scheduled to appear during times like the present. Was it not after the beginning of these hard times, and in spite of them, when everything began coming to us wrapped in cellophane?



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Research Investment Liquidated in Seven or Eight Years

"Success in research and development comes on the average only after a long pull," added Dr. Redman. "True, we sometimes realize handsomely after only small expenditures of time and money. But these bursts of good fortune merely serve to offset those adventures that prove to be a dead loss. If we would prosper through research and development, we must count on years of outlay and effort, or make no start at all. Average experience suggests as a fair expectancy, from the start of research to full liquidation of the investment, a period of seven or eight years.

"Chemists are fully mindful of the existence of this long time factor. We are anxious that the same may be said of our business executives the country over. We believe that among our leaders in business and industry the number is diminishing of those to whom science is synonymous with mystery and to whom its creative processes are lucky whirls of the wheel of fortune, instantaneous discoveries, and not the result of long, sustained exercise of scientific skill.

Not to Be Overdone in Periods of Prosperity

To make continuity of effort possible, the program of research, and its much more expensive development, should be held to an even keel, said Dr. Redman, in concluding his address. It must not be overdone in a period of prosperity if it is to be maintained in a period of depression.

"Is it too much to hope that the practice of putting by a surplus fund for research, when there is enough and to spare, to be drawn on when retrenchment is the order of the day, will soon become a commonplace of a sound industrial management?" he asked.

"Not only is it unwise to start, during a period of prosperity, a development project that one could not hope to carry through during a period of depression, but it is all too easy in the best of times to get involved in ruinous expenditure before developments of even the greatest promise have had opportunity to round the curve and begin to pay their way."

ANTHRACITE GAS FOR HEAT TREATING AT LOWER COST

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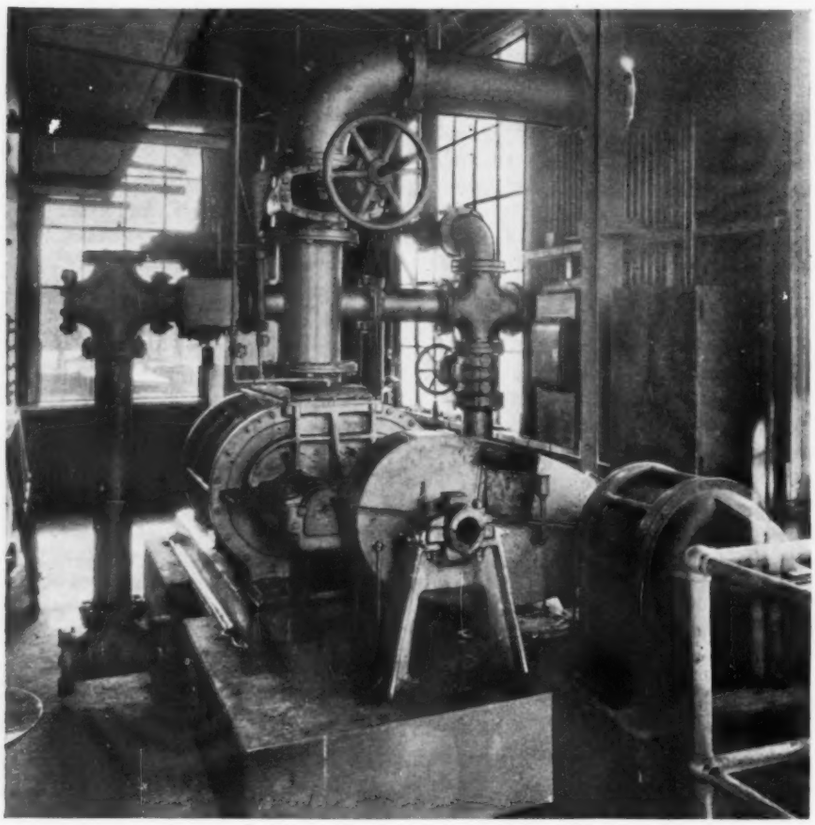
SEVERAL installations of producers burning anthracite coal and making anthracite gas have been put into various industries by the Dover Boiler Works, 50 Church Street, New York. These producers are the design of A. L. Galusha of that company, and are reported to be making gas of thoroughly satisfactory grade at a cost below that of the city gas, which customarily was burned by these companies in similar service previously.

Installations in plants of seven different metal-working companies in the United States have been made, varying in size from a single unit, or machine, to four units. The units are of two standard sizes, 8 ft. and 10 ft. These plants have been designed for consumption of from 4300 tons of coal annually in the smallest installations to 22,000 tons in the largest. Their production of gas, on the basis of city gas equivalent in B.t.u., ranges from 173 to 900 millions of cubic feet.

Usually these units are employed in some form of heat treating. In at least one instance of a good-sized plant, however, this anthracite gas has become the standard fuel of the plant, although other fuels are used also.



Lower section of plant, with exhauster taking gas from the scrubber and passing it into the line for distribution where needed.

In one plant where the gas is used in normalizing furnaces for full-finished steel sheets, and where a 5 per cent excess of gas is passed through the furnace to make sure of having a reducing atmosphere in the working and cooling chambers, the results are reported to be entirely satisfactory. In this plant the same gas is used also in pack-heating furnaces supplying hot steel for some of the hot rolls. Bituminous coal is still being burned in the pair-heating furnaces and in box annealing ovens where the products of combustion do not come in contact with the material being annealed.

How the Gas Is Made

PRODUCER gas is made by this means from No. 2 buckwheat size anthracite, which is one of the cheapest grades of that type of coal. The coal is dumped into a hopper, from which it is picked up by bucket elevator and taken to the top of the machines, and thence passed as required into the individual hopper of each machine unit. This hopper is divided by a horizontal steel diaphragm about midway of its height, so that the storage coal at the top, in contact with the atmosphere, may be kept strictly separate from the lower part, where the coal is in free connection with passages leading to the producer combustion chamber.

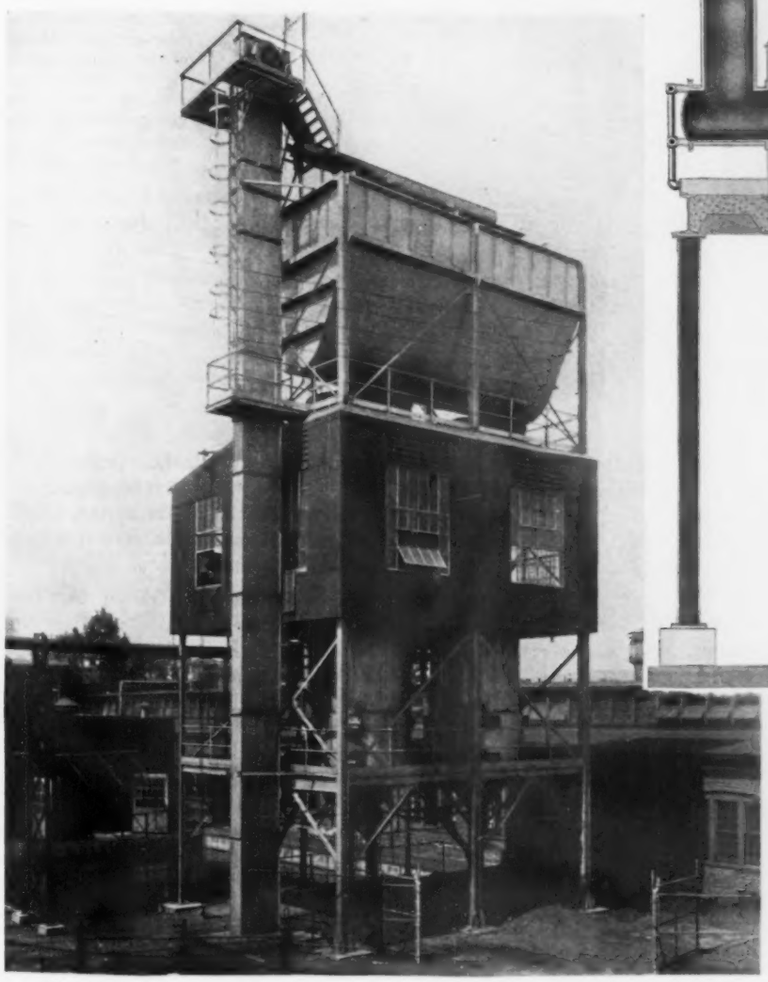
A valve in the hopper diaphragm is interlocked with the several openings through which coal is cascaded into the producer chamber, in such manner that when the one valve is open the other must always be closed. In this way unwanted air is kept out of the top of the producer and the stacks of coal standing in the filling pipes and being slowly preheated are not subjected there to possible combustion.

Air, with a definite amount of water vapor in it (furnished by steam from the water-jacket, no separate

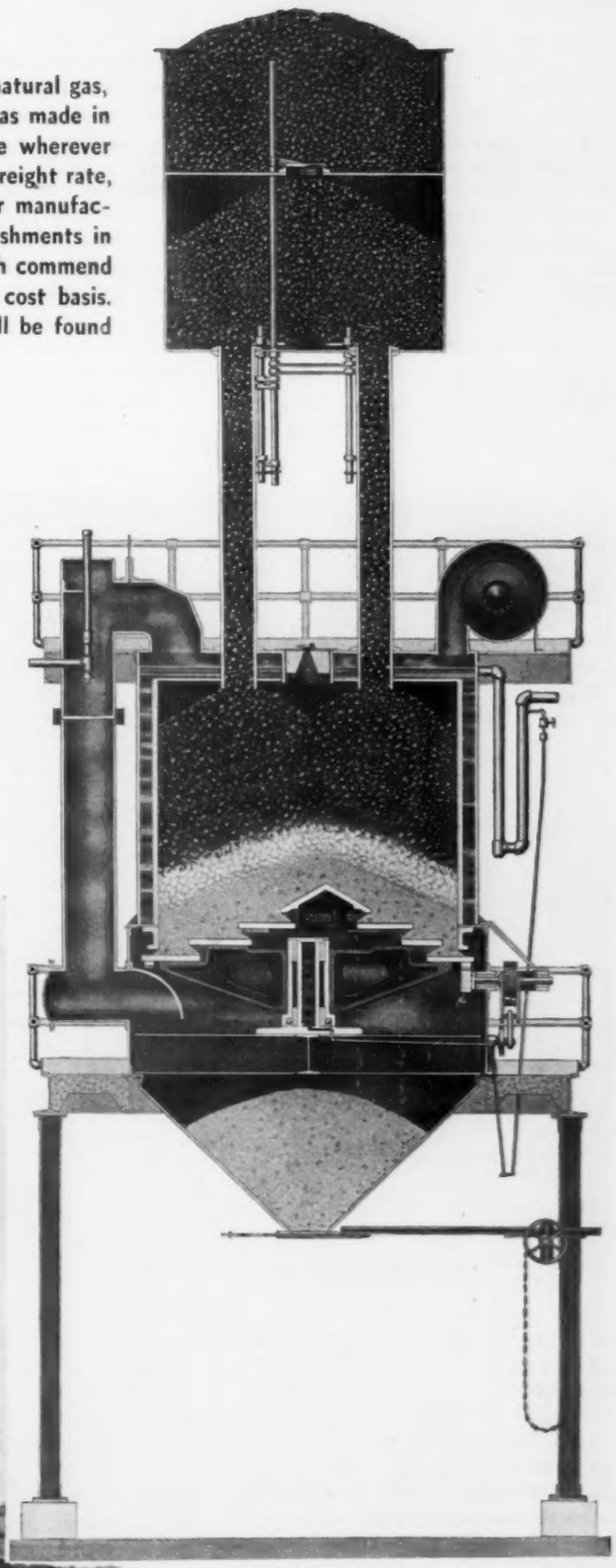
A COST for manufactured gas putting it on a plane with natural gas, on the basis of B.t.u. price, is reported for anthracite gas made in producers. Add to this the fact that this cost is available wherever buckwheat sized anthracite can be had without too great a freight rate, and its wide implications are apparent. Plants equipped for manufacturing this gas, put into a number of metal-working establishments in the Northeastern area, are reported to be giving results which commend themselves to management, entirely aside from the mere cost basis. How the equipment operates and some of the cost data will be found in this article.

steam supply being required), is passed into the producer under low pressure and the gas coming off at the top is run through a scrubber, the main purpose of which is to remove the dust in the stream of gas. On entering the scrubber, the gas has a temperature of 500 to 700 deg. F. It leaves the scrubber at perhaps 80 deg. F., having given up its heat to the water, passing through in a thin spray and trickling down over the coke filling, to entangle the dust particles.

Hence the gas, as it arrives at the point of use, is at about room tem-



GENERAL view of an installation of two producers, each with inside diameter of 8 ft. Each producer can burn half a ton of coal hourly. Bunker capacity is 150 tons.



CROSS-SECTION through producer unit, showing interlocking gates for coal at top, showing fan and the air and steam passages over top of water jacket and down below the grate, and the eccentric form of grate, which automatically discharges ashes as it rotates. Ashes are removed periodically as convenient.

perature. It is exhausted through the scrubber by means of suitable equipment, in most cases a Roots exhauster, by which it is sent at about 2 lb. pressure through the pipe lines leading to the several points of use. In some cases it is transported a considerable distance in the open air —over the roofs of buildings or with the pipe hung on brackets on the building walls.

Low Cost of Gas Production

WHILE the use of the reducing atmosphere in some of the furnaces in which this gas is being used is by no means unique, yet the fact must not be lost sight of that this atmosphere practically precludes the possibility of scale formation on the sheets, or wire, or whatever other product is going through. Losses from this source have been reported in some instances as practically wiped out. It is when we figure on the cost of the fuel for this purpose, however, that the ease (from the pocketbook standpoint) of obtaining this reducing atmosphere will be appreciated.

In a number of installations, some of which were visited by a representative of THE IRON AGE, the gas is being made at a cost not far from 5c. for each 1000 cu. ft. This figure includes coal, labor, power, water, repairs, supplies and interest and amortization of equipment. The fuel has about 150 B.t.u. for each cubic foot. When it is used to replace city gas of 550 B.t.u., about 3.7 times as many cubic feet will be needed. Hence, the cost on the basis of 1000 cu. ft. of city gas works out at 18 to 20c. But a 50 per cent excess of fuel to maintain a reducing atmosphere can show a marked saving with this low-cost gas. Figures of performance at one plant are given in the accompanying table.

This saving of 62 per cent arises partly from the fact that the 3000 cu. ft. for reducing atmosphere does not have to be multiplied by the conversion factor for B.t.u. equivalent. It is merely the bulk that is needed, to keep air out of the furnace, and the same volume of gas suffices in each case.

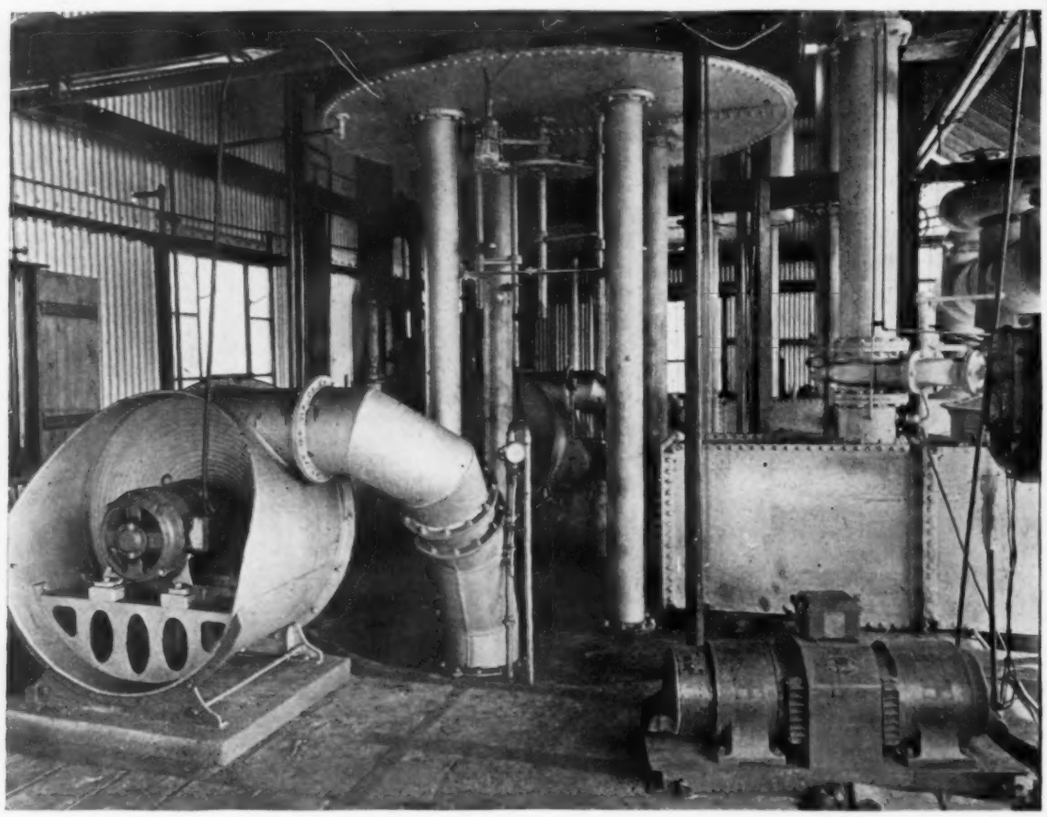
In one industrial plant containing four of the large producers, the man in charge of operation reports that he can make 400,000 cu. ft. an hour. Both in this plant and in another one visited, the report was that there had never been an hour's delay chargeable to the gas equipment since it was put in. In one plant this meant a period of eight months, while in the other it was a matter of three years.

Close control is maintained in the gas house through recording gages and a set of U-tubes, with reports hourly on many of the features of operating conditions. One interesting thing is the way in which the thickness of the ash bed is watched. To avoid burning out the grates at the bottom of the producer, an effort is made to keep this ash cushion about 10 in. thick.

Steel rods are run down through about eight peep holes in the top of the producer, until they come up against the solid grate plates. These rods are left in that position for a minute or two and then hauled out in regular rotation corresponding with the particular hole into which each was inserted. The lower end, which was in the ash bed, is black. The next section, which was standing in the fire zone, has been heated red hot. Above that it tapers off to black again. The length of the lower black

(*Concluded on page* 190)

Fuel for One Hour	City Gas	Anthracite Gas
Heating load, 7000 cu. ft. at 35c	$2.45	....
Equivalent, at 17c	....	$1.19
Excess to maintain reducing atmosphere, 3000 cu. ft.	1.05	0.15
	$3.50	$1.34



WORKING floor in an anthracite producer plant with two units. The four vertical pipes in center convey coal from the hopper above to the producer below the floor. At left, the fan forces air at low pressure over the top of the producer water jacket, picking up moisture and thence going through the grates and up through the burning mass.

REO CUTS INSPECTION COSTS BY USING NEW-TYPE GAGES

FACILITIES for rapid, as well as accurate, inspection are provided at the plant of the Reo Motor Car Co., with a view to keeping inspection costs at a minimum. A few of the gages, including the newer electric type, are briefly outlined in this article.

CLOSE tolerances specified in the production of parts for Reo motor cars and in certain cases the necessity of 100 per cent inspection have caused the Reo Motor Car Co., Lansing, Mich., to pay special attention to inspection devices for measuring the accuracy of work turned out by manufacturing departments. Among these devices are a number of gages chosen not only for accuracy, but also for the rapidity with which they can be used, with a cut in inspection costs as a result. This article will describe a few of the instruments employed.

Piston Pins Checked by Electric Gage

For inspecting the outside diameter of piston pins, the company uses a new type of electric gage, known as the visual gage, having a magnification of 5000 to 1. That is, the measuring scale, which is 5 in. long, represents 0.001 in. Thus, 0.0001 in. actually is ½ in. long on this scale. The small graduations are 0.000025 in.; yet the operator can read the measurements easily without eye strain. The gage is actuated by a shadow which is magnified by passing through two condensing lenses. Inserted in the anvil of the gage is a strip of tungsten carbide, while on the end of the spindle is mounted a diamond; both of these are to eliminate the possibility of wear.

The operator sets the gage by placing a master setting gage under the spindle and moving the adjusting device on the spindle so as to bring the shadow line to the desired position on the scale. When the gage is set, it will maintain its reading without change indefinitely. The gaging mechanism has no pivots or movable joints so that wear is entirely eliminated. The base is of cast iron.

Electric Gage Is Portable

Weighing only 40 lb., the gage is portable and can be operated electrically by plugging it into a standard light socket. Accompanying the gage is a transformer which reduces the current from 110 volts a.c. to 6 volts a.c. A standard automobile stop-light bulb is used for lighting the gage. For obtaining any desired diameter, the instrument head is adjustable either up or down on the base post by rack and pinion and is locked in place by a double equalizing clamp. Made by the Sheffield Machine & Tool Co., Dayton, Ohio, the gage is suitable for measuring not only piston pins, but also free wheeling rolls. It likewise is used for checking fine gages. It is just as adaptable to fine production inspection as to fine gage work.

OUTSIDE diameter of piston pins being checked on a visual electric gage having a magnification of 5000 to 1.

For measuring the big end of connecting rods, an inside indicator gage made by the Swedish Gage Co. of America, Detroit, is used. This provides a three-point contact in the bore. A similar gage tests the accuracy of the small end of the connecting rod. The diameter of the big end is 2.190 in., held within limits of plus 0.0000 and minus 0.0005 in. The diameter of the small end is 0.9838 in. with the same limits as for the large end.

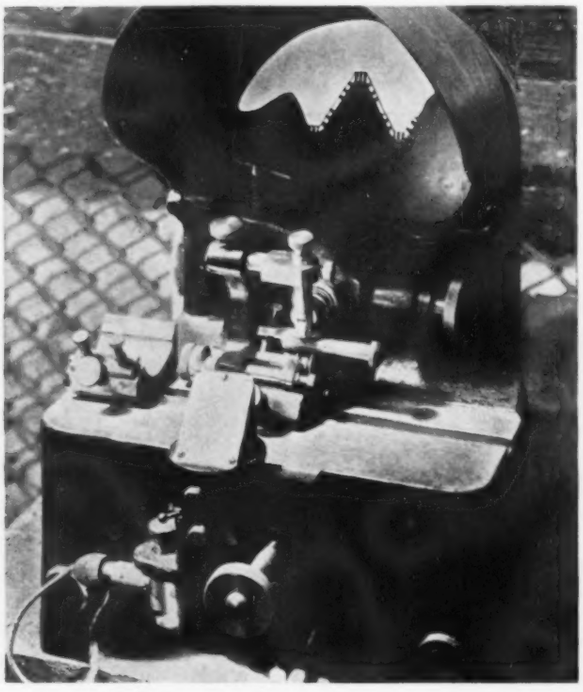
Crankshaft Bearings Checked

Crankshaft main bearings and pin bearings are checked by means of a Zeiss passameter caliper gage of the indicating comparator type. It has a three-point contact for measuring out-of-roundness and taper. The contact anvils consists of Widia metal to assure permanency, being adjustable for variations in gaging diameters. Tolerance limits are set by means of two red pointers movable externally. The main bearing diameter is 2.625 in., with a tolerance allowance of plus 0.0000 and minus 0.0010 in. The pin bearing diameter is 2.1875 in.

with limits of plus or minus 0.0005 in.

The outside diameter of valve tappets is measured by a Sheffield electric indicator gage, made by the Sheffield Machine & Tool Co. This instrument flashes colored signal lights indicating that work is correct, oversize or undersize, and is accurate to 0.00001 in. The diameter of the valve tappets is 0.625 in. with tolerances of plus or minus 0.0005 in.

An instrument finding wide application is the J. & L. Hartness comparator, made by the Jones & Lamson Machine Co., Springfield, Vt., which checks thread profiles, but also can be used for matching all kinds of odd-shaped surfaces, such as flat cams, against a master outline. It consists of a light source, a condensing lens system for locating definitely the parts being compared, a compound microscope which magnifies the object 50 to 100 times and a tolerance chart on which the magnified data are received. The outline of the parts to be tested is projected on the tolerance chart, which represents the maximum and minimum outline drawn to show the permissible variation. One application of this device is the checking of the thread profile of connecting rod bolts. This is a 100 per cent inspection job.



THE threads of connecting rod bolts are checked against a master on a Hartness comparator.

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CHECKING the large and small ends of connecting rods to limits of plus 0.0000 and minus 0.0005 in. with a Swedish internal indicator gage.

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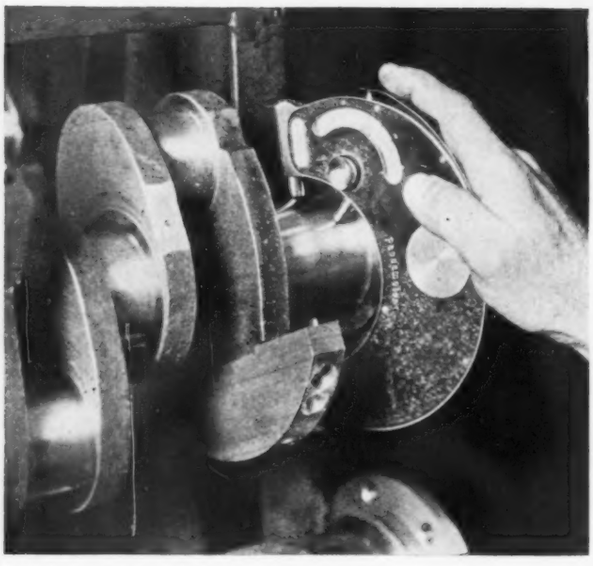

APASSAMETER caliper gage provides a three-point contact for measuring out-of-roundness and taper of crankshaft bearings and pin bearings.

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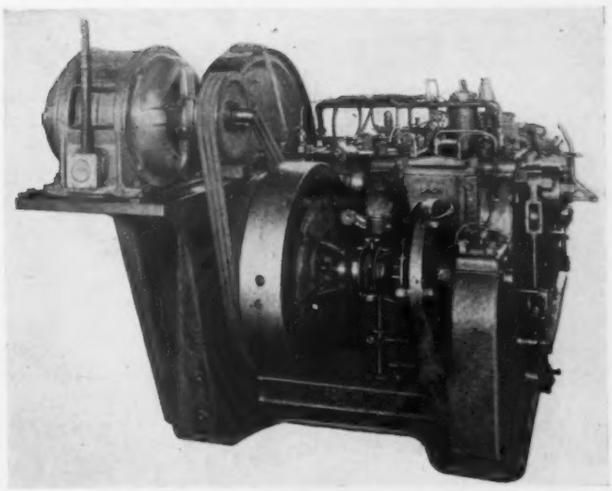
More than $300,000,000 was invested during 1931 in the construction of long-distance pipe lines, according to Alexander Forward, managing director, American Gas Association.

Friction Drive Applied to Acme Forging Machines



CAM - OPERATED driving and friction clutches make for smooth action.

A POSITIVE friction drive for its line of heavy-duty forging machines has been developed by the Acme Machinery Co., Cleveland, to replace the positive clutch pin drive that is commonly used. Described as an innovation in forging machinery construction, this friction drive is simple in design and is built to provide a high factor of safety for the maximum load it may be called upon to carry.

The flywheel is the only rotating member when the machine idles. The machine is started by pressure on a foot treadle which releases a spring that engages the driving clutch. The machine moves through the heading and receding cycle and on the return of the receding stroke disengages the driving clutch and engages the braking clutch. The contour of the cam, which actuates levers operating the clutches, is such that the crank is always stopped and held in the same position on the extreme back end of the stroke. In operating the clutches from driving to braking action, the cam also compresses the spring for the next operation. The clutches are of rigid construction and have large friction surfaces.

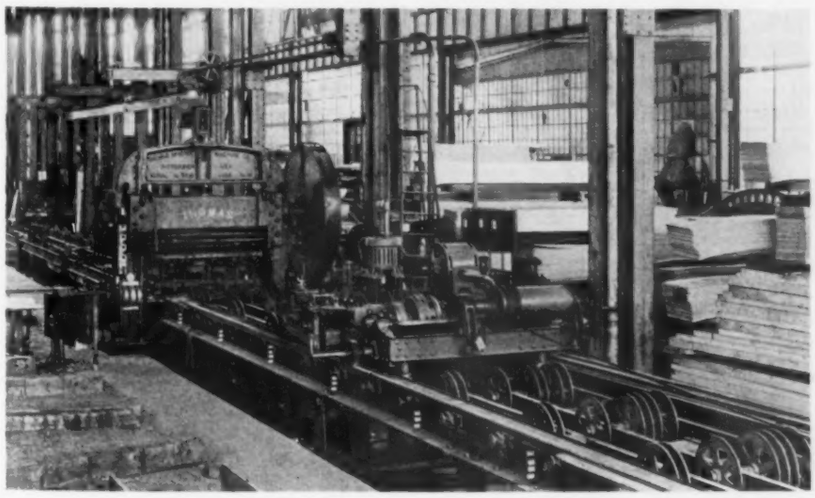
High efficiency is claimed for the machine because of its instantaneous starting. It starts smoothly, it is pointed out, and without the loss of time caused in types of drives which require a partial revolution of the crankshaft or driving gear before the machine starts. Better forgings, it is claimed, result from the quick starting, because there is no loss of heat from the stock being worked and because the heading tool approaches and recedes from the end of the stroke with a positive movement and without play or back lash, which permits the material to flow uniformly and eliminates the tendency of the crank to recede ahead of the driving member after passing the center.

Other advantages claimed for the drive are that it makes the machine practically noiseless in operation and that it cushions the starting and stopping action, eliminating shock to the machine and parts as well as to the motor. In case the machine is stalled by an overload, the clutch cushions the stopping of the flywheel, thus eliminating shock. The cushioned starting and stopping action also is claimed to result in a lowering of maintenance costs. As the pressure required on the foot treadle is very slight, the energy of the operator is conserved.

Multiple Punching of Structural Members

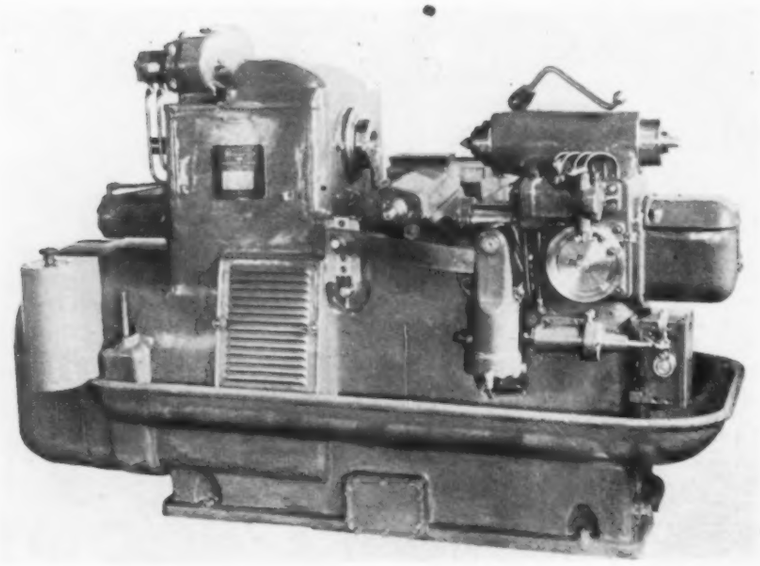
DESIGNED and built by Thomas Spacing Machine Co., Pittsburgh, this multiple punch and automatic spacing machine was developed as a time and overhead saver for fabricating shops. The machine covers a wide range and assures speed and accuracy on duplicating work. The illustration shows an installation in the plant of the Mahon Structural Steel Co., Detroit.

Two pairs of angles, two cover plates, one wide plate, wide flanged and girder beams are punched with tool set-up for both flanges and webs at the same time. The operation of the machine is entirely automatic. The tools on the punch and the table rolls were specially designed to cover the range specified, with a minimum of changes. Thus, a pair of angles may be punched on one side and a cover plate on the other, either separately or simultaneously. Set-up is so simple that the machine is suitable for punching just a few duplicate pieces, as well as for large runs of duplication work.



New Acid-Proof Cement Avoids Acid Painting

FOR lining pickling and galvanizing tanks, acid towers and for other applications particularly in the chemical industries, the United States Stoneware Co., Akron, Ohio, has brought out Pre-Mixt acid proof cement. Offered in powdered form, the cement is mixed with water on the job and handled in the same manner as ordinary portland cement, no special technique being necessary. No acid painting is required to render the hardened cement joints both acid and water proof. Fast setting is a feature; initial set occurs in about an hour, and final set in 24 hours. There is said to be practically no expansion in the finished joints. The material will withstand all neutral and acid solutions except hydrofluoric acid.



Automatic Lathes Designed for New Hard Alloy Cutting Tools

AN automatic lathe designated as the No. 8 and having "multi-range" hydraulic feed with direct drive from motor to the spindle through multiple V-belts has been added to the line of the John S. Barnes Corpn., Rockford, Ill. Drive is by a variable-speed motor with automatic hydro-electric control for starting and stopping the spindle as well as the slides. There is no clutch.

Headstock, tailstock, bed, motor compartment, chip pan, coolant reservoir and base are all in a one-piece rigid casting designed to maintain proper alinement. The spindle is mounted in anti-friction bearings to permit operation at the higher surface speeds possible with cemented carbide tools. This arrangement, coupled with the rigid construction, provides for the greater power input that effective use of the new tools require. The spindle rotates clockwise or opposite to that of the conventional lathe; this, in conjunction with the arrangement of the front and rear carriages, is designed to put the full load on the lathe bed.

The feed pumps, designed and built by the Barnes company, are driven from the main spindle; a separate gear pump, driven by an individual motor, actuates the rapid traverse. In operation, the slides are brought up against positive stops, a feature intended to maintain the accuracy of the machine throughout its life.

Faster set-up and quick change-over from one job to another are said to be made possible by the automatic hydro-electric control. Both front and rear carriages are automatically rapid-traversed to the work and returned. The front carriage is first fed forward to bring the tools in to the correct depth; then drops back longitudinally to relieve the tools on the return stroke. The pivot for the carriage guide bar can be adjusted so that the bar is inclined for tapers and horizontal for straight turning, thus providing a standard machine means for taper work.

Separate feeding pumps are provided for each carriage, the rear carriage being fed independently of the front. The rate of feed for each carriage is regulated by indivdual dials.

The tailstock has a live center which is mounted in widely spaced anti-friction bearings. Its sleeve, carried in an adjustable quill, is clamped by means of a single lever.

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New 14 to 20-In. Engine Lathes Have 16 Speeds

A LINE of 16-speed engine lathes in 14-in., 16-in., 16-in. heavy and 20-in. sizes, has been added to the line of the Reed-Prentice Corpn., Worcester, Mass. The headstock of the new lathes provides for the increase in number of speeds from eight to 16 and a new quick-change gear mechanism gives all thread and feed changes without the use of pick-off gears. The end gears are mounted in anti-friction bearings. The use of four-bearing spindle mounting with precision Timken bearings has been retained.

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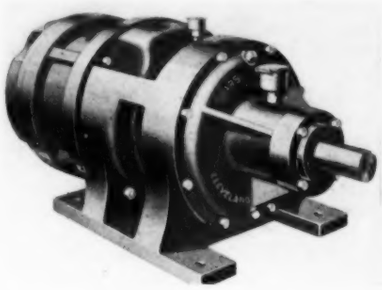
Self Contained Motorized Speed Reducers

A MOTORIZED speed reducer, with planetary type gearing built integral with an electric motor, forming a single compact unit, has been placed on the market by Gears & Forgings, Inc., Cleveland. It is for use particularly where available space for the driving mechanism is limited. The planetary gears are designed to give greater reduction in smaller space than any other system of gearing. The dust-proof and oil-tight gear housing is integral with the base



which extends to the center line of the motor and also provides rigid support to the gearing and output shaft which carries the load. No additional loads are imposed on the motor shaft which runs in two ball bearings. The units are obtainable in 34 standard ratios ranging from 4:1 to 240:1, and in sizes ranging from ¼ to 30 hp.

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The Department of Commerce, except for the Bureau of Standards, is now housed in its mammoth seven-story new building in Washington.

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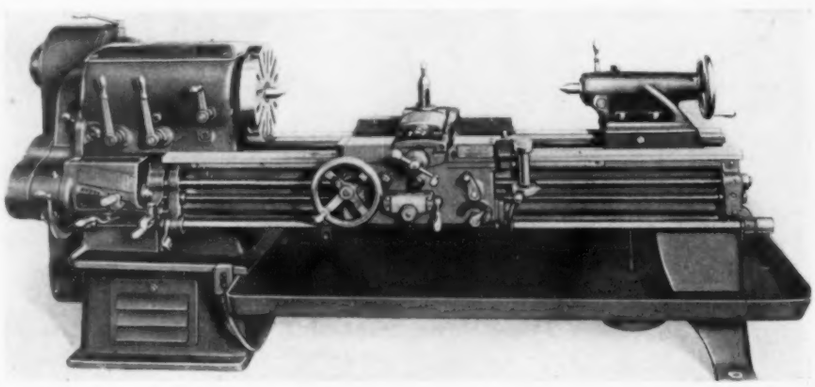
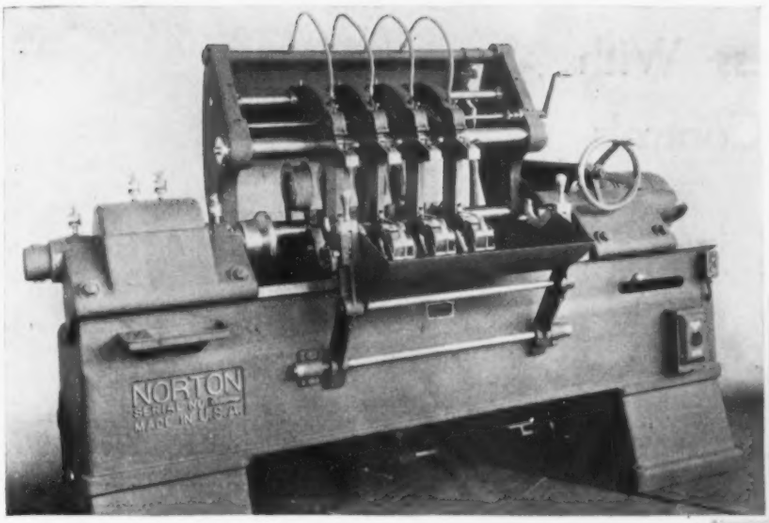
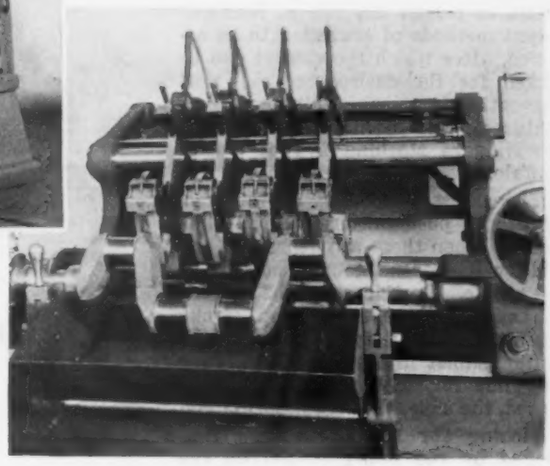




ABRASIVE paper fed from rolls is the lapping agent in this machine. Detail view below shows arms which lap pins and bearings.



Laps Crankshaft Pins and Bearings Simultaneously

SIMULTANEOUS lapping of the pins and bearings of automotive crankshafts is done by the machine here illustrated, a new product of the Norton Co., Worcester, Mass. The shaft to be lapped is rotated between a live headstock and a floating footstock center. Lapping arms, one for each pin and bearing, are equipped with telescoping reels, each carrying a roll of abrasive paper. Each time a lapping arm is withdrawn from a pin or bearing the reel is indexed automatically, thus a fresh, unused abrasive surface is always presented to the surface to be lapped.

The crankshaft is moved back and forth in the direction of its axis by means of a reciprocating mechanism in the headstock, which eliminates all grinding wheel marks and materially improves the finish. Lapping lubricant is supplied to each arm by a pump.

A heavy box-section casting forms the machine bed; upon it are mounted the headstock, footstock and the housing which supports the lapping arms. The headstock remains fixed at one end of the machine, the footstock being adjustable to accommodate a range of crankshaft lengths. The footstock center is treadle operated, permitting the operator to use both hands when loading or unloading the machine. A work-loading fixture can be attached to the front of the bed as additional equipment, this being of great help when heavy crankshafts are lapped.

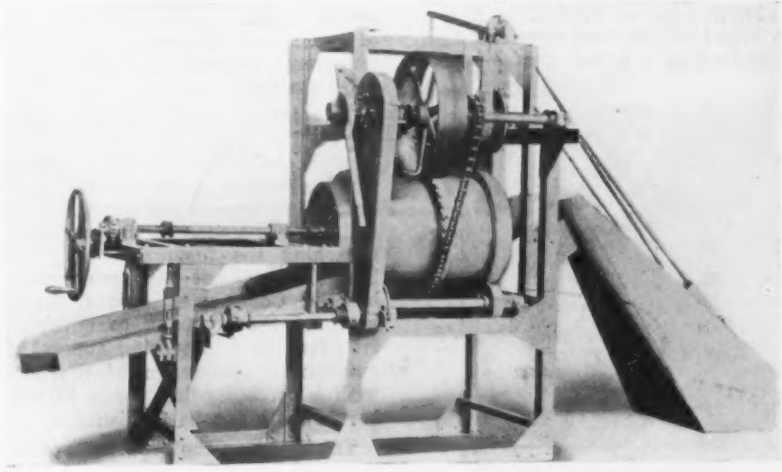
The supporting housing for the lapping arms is an important feature. When the lapping of a shaft is completed each arm is released and the housing swung backward by a spin of the handwheel. In this manner the lapping arms and their supporting members are out of the way in loading and unloading.

The machine will swing 16-in. diameter over the table and will receive a maximum length of 48 in. Crankshaft pins and bearings up to 2½-in. diameter and 4½-in. long can be lapped. The machine, either motor or belt-driven, weighs 4800 lb. and requires about 56 x 104 in. floor space.

New Cleaning Equipment Handles Cut Nails

COST reduction in the manufacture of cut nails, resulting from the use of the tumbling equipment shown here, is reported at the plant of the Tremont Nail Co., Wareham, Mass. This company makes a hardened steel cut nail for use on hardwood flooring, concrete form-work and various other applications that require a nail that will drive straight and will not bend.

Nine tumbling barrels formerly used were replaced by one Ideal barrel, installed by N. Ransohoff, Inc., Cincinnati, whose engineers surveyed the cleaning problem and added a special vibrating screen to one of their standard models. Work is lifted from floor level by a power-operated loading skip and introduced into the tumbling chamber, where it is tumbled in a small quantity of sawdust. It is then discharged to the vibrating screen, which separates the sawdust and delivers the cleaned nails to kegs.



Double-Crank Press With Improved Safety Controls

FEATURES making for safety and convenient operating control of the large double-crank press here illustrated permit any one of four different methods of operation to be selected, after which the control can be locked for the desired method, thus preventing tampering with the safety features. The machine was built by the Niagara Machine & Tool Works, Buffalo.

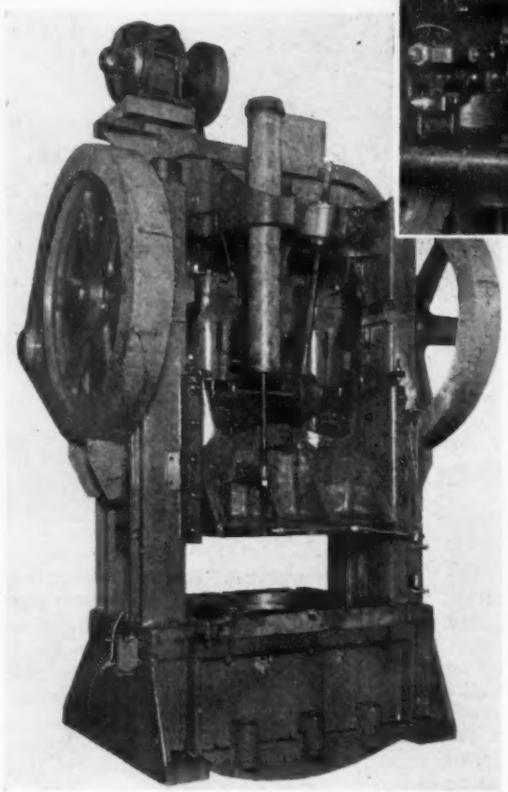
The safest method of operation is by use of push buttons on the slide itself. When these are depressed, the slide will descend to the bottom of the stroke. On release of the buttons the slide will return to top stroke where it stops automatically. The operator cannot injure his hands under the slide for, if the buttons are released, the slide will stop immediately.

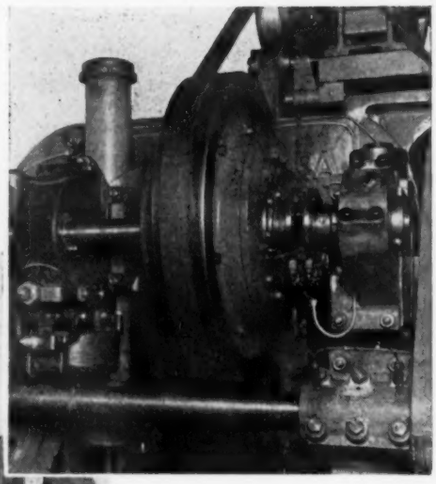
Inching for setting dies is controlled by the upper button on the right-hand housing, the slide operating continuously as long as the button is depressed.

Another control is provided so that when the push buttons are depressed the slide will make a complete cycle, stopping at top stroke. As long as the buttons are kept depressed the slide will continue to repeat its cycle.

For continuous operation with a roll feed mechanism, the control can be set so that the press is started by pressing the upper button at the right. Operation continues until the lower button on the housing is depressed.

The clutch used in this press is of the multiple-disk type, magnetically operated. It is built into the flywheel which has anti-friction bearings and runs free on the shaft. The magnetic control is designed to cause the friction surfaces to engage gradually, permitting smooth acceleration without grabbing. An electro-magnetic brake, mounted as shown in the close-up illustration, operates in conjunction with the clutch, being automatically released when the clutch is engaged. As the brake mechanism is a separate unit, mounted apart from the clutch, no heat from the brake is transmitted to the latter.





CLOSE-UP above shows magnetically operated clutch and brake at rear of press.

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The press itself is an 8-in. shaft machine of four-piece tie-rod frame construction. The slide is guided in square gibbing, adjustable by means of tapered steel keys. It is spring counterbalanced, the spring being completely inclosed in steel cylinders. Motor-driven slide adjustment is provided. A central pressure lubricating system supplies all bearings; the drive shaft runs on anti-friction bearings.

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Broaches Internal Gears in One Operation

A NEW type of broach, having a true involute tooth form and used for broaching internal gears, is being made by the Ex-Cell-O Aircraft & Tool Corpn., Detroit. The illustration shows the finishing end of the broach with the involute tooth form on each spline. Gears are finished in one pass of the broach, and additional operations, such as grinding or boring, are not necessary.

This broach starts from a drilled hole. The teeth in each row are straight to insure accuracy and finish; the section at the pull end of the broach is designed for sizing the hole and the remainder of the broach for broaching the form on each tooth. Special equipment has been installed by the Continental broach department of the company to develop a true tooth form covering general requirements. A range of diameters with a corresponding range in number of teeth can be furnished.

The limits on the broaches are held to 0.0003 in. on the splines and 0.0001 in. on the outside diameter; the accumulated error in the spacing of the teeth is said not to exceed 0.0002 in. The first section removes approximately 0.045 in. of stock. The pull end is designed for an automatic coupling which simplifies and speeds up the handling of the tool during the broaching operation. No broaching fixtures are needed for the job, as a soft steel reducing bushing supports the part during the operation, which is performed on a horizontal type of machine.

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Atlantic Refining Co., Philadelphia, has purchased 15 Askania automatic regulators to be used on the new Knowles coke ovens now being installed there, from H. A. Brassert & Co., Chicago. These regulators are used for pressure, draft and temperature control.

Light-Sensitive Device Weighs and Records Material Moving on Belt Conveyor

ACCURATELY weighing the steady flow of material passing on a conveyor belt, keeping careful count of the tons that have been handled and, finally, recording on a time chart the belt loadings throughout the period of conveyor operation—this is one of the latest jobs to which the light-sensitive cell ("electric eye") and electrical counter ("electric brain") have been applied.

As compared with former methods of accomplishing the same task, this light-sensitive device is said to offer several advantages, the chief of which are simplicity, lower cost and more positive adjustment. While the general scheme of weighing a continuous flow of material remains the same, the means whereby passing weights are converted into corresponding electrical impulses for the operation of the integrator has been radically changed with the introduction of the light-sensitive cell.

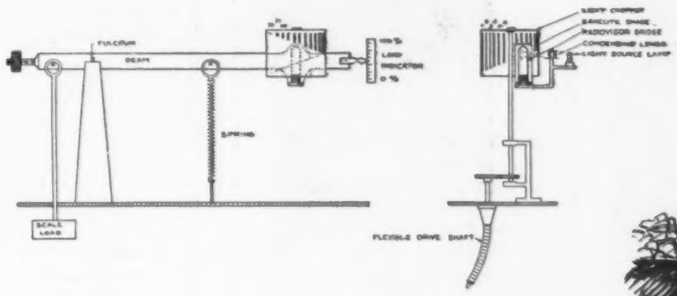
Better to understand this light-control application, let us begin with the main principle. To obtain the weight of a continuous flow of material, it is necessary to combine the size of the stream with the speed at which it moves. The speed may be constant, but the size of the stream may range from zero pounds per foot to the full capacity of the conveyor. Consequently, any variation of load must be instantaneously noted at the controller so that true integration of weight may be obtained.

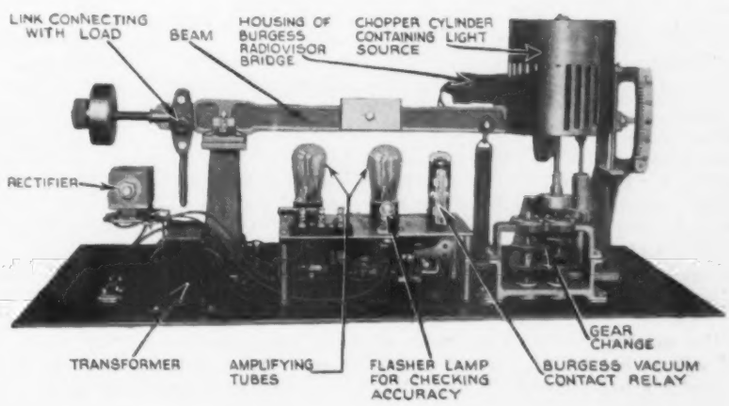
At the point where the continuous stream of material is to be weighed, a short section of belt is installed, mounted in such manner that its varying weight is communicated to the weight checking equipment placed directly above. With the varying weight of the load on the conveyor belt, the beam of the weight checking mechanism is actuated. The scale load at one end causes the fulcrumed beam to swing over the scale of the load indicator at the far or free end. This, of course, indicates the instantaneous weight, but there is still need for some device to keep tally of the continuous procession of varying weights. It is at this point that the "electric eye" gets to work.

Apparatus for Keeping Tally of Varying Weights

Close to the free end of the swinging beam is mounted a crossarm car-

THE scale load and the location of the condensing lens and light source lamp are shown in this diagram of the weighing head shown in the illustration. The Radiovisor bridge control is employed in connection with the Chatillon Telepoise continuous weighing and recording mechanism.





THIS apparatus weighs and records the varying loads carried by moving belt conveyors. Electrical impulses produced by the bridge, light source and chopper-cylinder are amplified to operate a relay that provides current for actuating one or more integrators, or electromagnetic counters, located at a distance if need be.

rying a Burgess Radiovisor Bridge or simplified form of light-sensitive cell, and a light source lamp. These members are so mounted that one is outside while the other is inside a revolving light-chopper cylinder which is driven in step with the speed of the belt. The light-chopper cylinder derives its name from the fact that it carries 32 parallel longitudinal slots which serve to interrupt the passage of the beam of light between light source and bridge. However, the slots are of varying lengths. The first is equal in length to the distance traveled by the scale beam from zero to full load. Each succeeding slot is shortened an equal amount at the bottom, so that a line drawn from the bottom of slot No. 1 around the cylinder to the bottom slot No. 32 would form a true helix, touching the bottoms of all slots.

The bridge or cell is mounted in a housing provided with a window directly opposite the sensitive plate. The condensing lens of the light source is adjusted to concentrate an intense beam of light through the window and on to the light-sensitive plate. However, the wall of the rotating chopper-cylinder comes between, allowing the light beam to pass only when a slot is in line. Each admission of light reaching the bridge sets up an electrical impulse, which impulse in turn drives the mechanism of the integrator or "electric brain" that keeps tally, as well as the time chart recorder.

With no load on the belt the free end of the beam is down, with the focused point of light just below the bottom of slot No. 1 of the chopper cylinder. Hence no impulses result, since no light reaches the bridge. However, as load is placed on the belt the beam swings upward proportionately, bringing the focused point of light higher and higher on the chopper cylinder, so that more and more slots admit light and cause a corresponding number of impulses to actuate the electrical integrator. The number of impulses is always proportional to the load, from zero to the capacity at which the scale is calibrated. At full load there are 32 contacts per revolution of the chopper-cylinder. With 350 contacts a minute and a belt speed of 350 ft. per min., an impulse is obtained for each foot of belt, which is representative of a certain amount of material passing over the scale.

Scale Balancing Is Simple

Balancing the scale is simple. A test weight is provided which represents exactly half load when hung on the beam. A switch serves to cut out the integrator and throw in a small lamp which flashes at each impulse. A change gear is provided, which slows up the revolutions of the chopper-cylinder so that the flashes may be counted. With no load on the moving belt, there should be 16 flashes for each complete cycle, if the machine is properly balanced. If out of balance, the scale is balanced with a balance ball as required, until 16 flashes are obtained per revolution. The test weight is then removed.

The electrical impulses produced by the bridge, light source and chopper-cylinder are amplified by means of a two-stage amplifier designed and built by the engineering staff of the Burgess Battery Co., New York. The amplifier output operates a Burgess vacuum contact relay capable of handling all the current required for the operation of one or more integrators or counters, which may be located at any distance from the scale. A rectifier converts stepped-down a.c. into low-voltage d.c., for the operation of the integrator and scale chart, in accordance with the makes and breaks of the vacuum contact relay. The integrator is simply an electro-magnetic counter with a number of units to represent the grand total of integrated weights.

The Telepoise, as the continuous weighing and recording mechanism is termed by its designer, E. J. White of the staff of John Chatillon & Sons, New York, builders of scales, is designed for use in factories, mines, warehouses and other plants where bulky materials are weighed in motion.

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European Machinery Market Closed Except to Specialized Tools

THE European outlet for American machine tools in the future will be confined largely to highly specialized machinery, tools well protected by patents and types of machines for which the demand is not large enough to warrant their manufacture abroad, in the opinion of C. J. Stilwell, vice-president, Warner & Swasey Co., Cleveland, who has just returned from a six weeks' business trip during which he visited machine tool manufacturers in England, France and Germany.

C. J. STILWELL

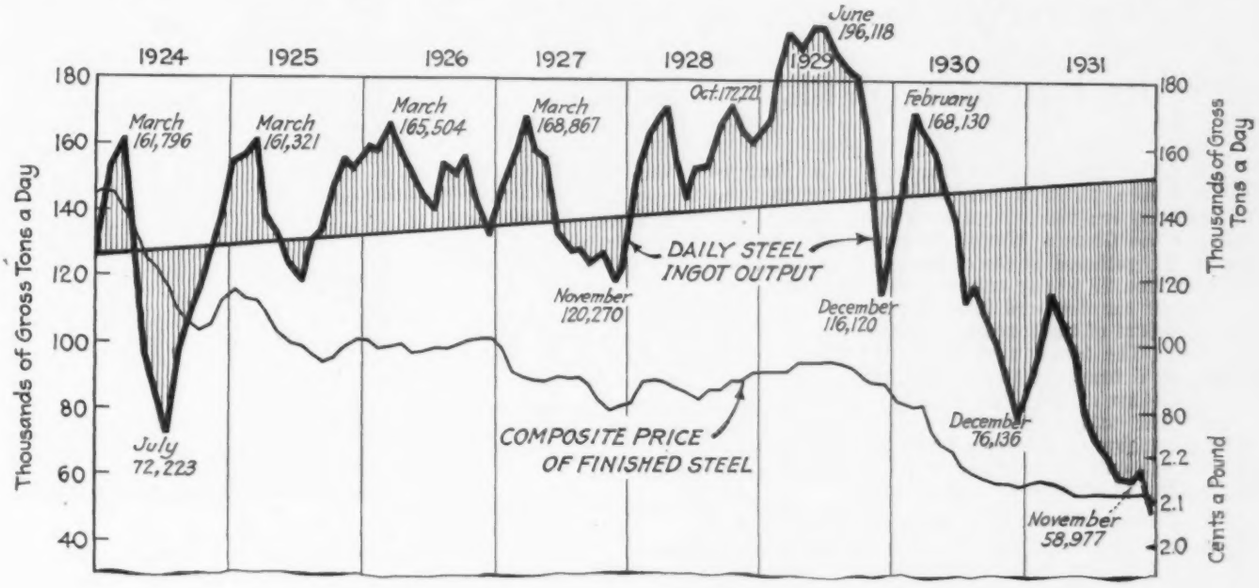
"I do not think there ever again will be much of a market for standard American machine tools in Europe," said Mr. Stilwell. "The European machine tool manufacturers have effectively copied American machines and the tools they are building now show a much better quality of workmanship than those built before the war. They are also fertile in new ideas and are bringing out new designs of machines. In addition, they are studying alloys and improving the quality of castings that go into their machine tools."

Mr. Stilwell heard a great deal of tariff talk abroad, and said that there is a tendency among the Continental nations to follow in Great Britain's footsteps in raising trade barriers. England, of course, has had the equivalent of a tariff wall against the importation of American machine tools ever since it abandoned the gold standard.

Machine tool plants in England had increased operations when he arrived there in November, Mr. Stilwell stated, and some were operating night shifts. The better operation was being maintained when he returned in December, although there was no further increase. There was an improved demand for machine tools in England from the radio industry, which was experiencing a revival, and there was also an increase in business from manufacturers of telephone equipment. However, much of the machine tool business was in Russian orders.

In Germany he found the machine tool manufacturers fairly busy, operating at from 40 to 90 per cent, but their business was largely in machines for Russia. The revolving credit fund of the German Government, which provides a guarantee of 70 per cent of the selling price of machinery sold to the Soviet Government, is proving very helpful to German machine tool manufacturers in selling machinery to Russia, as under this credit arrangement they are able to obtain 70 per cent of the price of the machine rather promptly and their capital is not tied up in long-term credits. Orders from Russia at present are largely for standard machines of good quality. Mr. Stilwell found evidences of a recent slowing down of machine tool plants in France, and said that these are not as busy as similar plants in England and Germany.

Ingot output in December reversed the November gain and made the lowest record since the summer of 1921. Prices averaged somewhat lower.



Steel Ingot Output in December at New Low Since 1921

PRODUCTION of steel ingots in the United States in December is reported by the American Iron and Steel Institute at 1,302.399 gross tons. This was the smallest monthly output in the year.

On the daily basis, with 26 working days, the average was 50,092 tons a day, a drop of approximately 20 per cent from the November daily figure of 63,747 tons. November made a gain of 8 per cent over October. The December daily output was the smallest since August, 1921.

December output represented 23.58 per cent, compared with 30.01 per cent in November and about 28 per cent in October and September.

Production in the 12 months is given as 24,900,195 tons, not including electric and crucible ingots, which may reach 200,000 tons. The decline from 1930 was 14,386,092 tons, or 36.6 per cent.

Bessemer ingots dropped back along with open-hearth ingots, whereas it was Bessemer ingots in November which, by a considerable spurt, raised the monthly and daily tonnage figures.

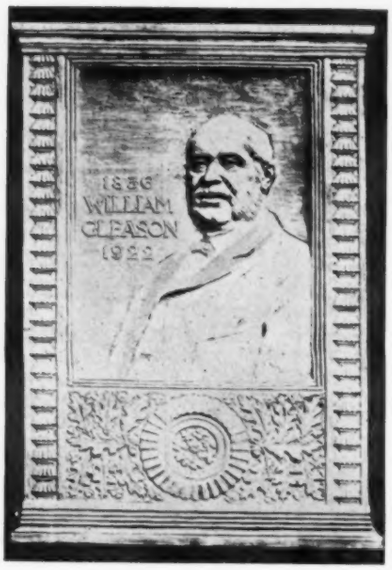
To find a smaller year's output it is necessary to go back to 1921, when the total was 19,224,084 tons. The 1931 total is nearly 30 per cent above that. It is above 1914 also, but otherwise the smallest since 1910.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

(Gross Tons)

	Reported by Companies Which Made 95.21 Per Cent of the 1930 Ingots		Calculated Output of All Companies		No. of Working Days
	Open-Hearth	Bessemer	Monthly	Daily	
Total, 1929	44,101,321	7,091,680	54,312,279	174,639	311
1930					
January	3,157,761	441,572	3,778,235	139,935	27
February	3,335,428	508,618	4,035,111	168,130	24
March	3,513,269	533,616	4,254,331	163,628	26
April	3,405,671	509,234	4,109,492	158,057	26
May	3,265,353	528,968	3,982,915	147,515	27
June	2,849,079	407,586	3,418,535	136,739	25
Six months	19,526,561	2,935,594	23,578,619	152,120	155
July	2,430,128	353,723	2,922,220	112,393	26
August	2,541,367	374,467	3,060,763	117,722	26
September	2,275,910	429,975	2,840,379	109,245	26
October	2,165,341	399,704	2,692,539	99,724	27
November	1,807,133	300,339	2,212,220	88,489	25
December	1,659,027	226,786	1,979,548	76,136	26
Total, 1930	32,405,466	5,020,588	39,286,287	126,322	311
1931					
January	2,044,298	296,620	2,458,689	91,063	27
February	2,085,529	296,972	2,502,366	104,265	24
March	2,504,060	346,139	2,993,590	115,139	26
April	2,275,404	316,668	2,722,479	104,711	26
May	2,083,833	301,639	2,505,485	96,365	26
June	1,730,109	246,365	2,075,910	79,843	26
Six months	12,723,233	1,804,403	15,258,519	98,442	155
July	1,570,776	225,030	1,886,153	72,544	26
August	1,462,720	174,380	1,719,462	66,133	26
September	1,274,321	199,151	1,547,602	59,523	26
October	1,320,158	195,943	1,592,376	58,977	27
November	1,276,906	240,441	1,593,684	63,747	25
December	1,069,468	170,546	1,302,399	50,092	26
Total, 1931	20,637,582	3,009,894	24,900,195	80,065	311

Gleason Works Unveils Tablet to Its Founder, William Gleason



OLD-TIME employees, 20-year service men, business associates of the company and the present management of the Gleason Works, Rochester, N. Y., gathered at the company's plant on Dec. 29 to pay tribute to the memory of the deceased founder and first president of the concern, William Gleason. The occasion was the unveiling of a bronze tablet containing a portrait-bust of Mr. Gleason in bas-relief. The tablet is placed in the entrance lobby of the plant at the head of the entrance stairs in a paneled setting of tile and weathered oak.

Miss Eleanor Gleason, a daughter of the founder, read a brief biographical sketch of her father before the unveiling. She traced his life from the time he left Ireland as a boy, through the years that accompanied the building up of a new industry.

Mr. Gleason was born in Tipperary County, Ireland, in 1836. He located in Rochester when about 15 years of age. He first obtained work on a farm, but soon went to work for Asa R. Swift, who kept a small machine shop.

From Swifts he went to I. Angell's & Sons' machine shop, where he finished his apprenticeship. He married shortly after he had finished learning his trade and then went to Hartford, Conn. During the Civil War he worked in Colt's Armory.

In 1865 Mr. Gleason returned to Rochester and started a machine shop for the making of tools. Shortly afterward he formed a partnership with John Connell and James S. Graham to make machines and tools. This firm continued until 1873, when the partnership was dissolved. Mr. Gleason then went with the Kidd Iron Works in Brown's Race. While there he invented his first bevel gear cutting machine.

Until that time bevel gears had been cast from wooden patterns and the burrs were filed and chipped off by hand. Mr. Gleason saw the need of some better method of making bevel gears. His bevel gear planer proved the answer. The Kidd Iron Works, however, would not finance the enterprise, so he had to build this first machine with his own money. In 1875 Mr. Kidd went to Albany and Mr. Gleason purchased the business from him. The bevel gear planer was patented in 1876.

Originally, the business comprised the manufacture of a general line of machine tools, lathes, planers, etc., but with the introduction of the new bevel gear planer, gradually more and more effort was devoted to the manufacture and improvement of this type of machinery, until at the beginning of the present century the company began to devote itself exclusively to the manufacture of bevel gear-cutting equipment, and that is its business today.

So well was the first machine built and so far was it ahead of its times that it saw use for more than 42 years. In 1915, the Gleason Works bought it back from the then owners. It has since, at the request of Henry Ford, been presented to the Ford Museum at Dearborn, Mich.

In 1910 the company built the first unit of its present plant in University Avenue, Rochester. Today the plant covers 22 acres. Its products are shipped all over the world. It manufactures perhaps 80 per cent of the bevel gear-cutting machinery of the world. In the United States, with a single exception, and that a car having only a very small production, every passenger automobile has in it gears cut on Gleason machines.

William Gleason was active until shortly before his death in 1922, but in his later years confined his activities to an advisory capacity. Those who knew him say that his character is well summed up in the inscription on the tablet: "A master craftsman, endowed with indomitable will, a spirit of independence, and broad vision, who created a new type of machine tool and founded this business on ideals of service and fair dealing."

While the dinner was intended only to honor the founder, present employees of the concern found it an opportunity to show their esteem for the present management also. On behalf of the present employees, Schuyler H. Earl, works manager, presented to James E. Gleason, president, and Andrew C. Gleason, vice-president and treasurer, a bronze replica of the tablet unveiled to their father, but containing a suitable expression of the esteem present employees hold for their present officers, "faithfully adhering to the ideals of the founder."

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High-Tension Welding Rod and Its Characteristics

WELDING wire of high tensile strength was referred to prominently in THE IRON AGE of Dec. 3, 1931, page 1430, in connection with maintenance work through electric welding. A special electric steel wire with a tensile strength of 92,000 lb. to the square inch was recommended by Col. Royal Mattice for jobs on cast steel and other places where a high tensile strength in the machine material exists.

In response to queries as to the ductility and other characteristics of this welding wire or rod, Colonel Mattice has furnished information which is here summarized. The wire has from 0.34 to 0.40 per cent carbon, 1 per cent manganese, 0.08 per cent silicon, 0.03 per cent phosphorus and 0.025 per cent sulphur. "The ductility of this rod," says Colonel Mattice, "is favorable, but not high, because we want brute strength. The ductility in welding mild steel is about 16 to 18 per cent; in welding cast iron, it is about 6 per cent in elongation. The action of the welding heat is to anneal the wire.

"In taking test specimens welded with our high-tensile-strength wire the break always occurs outside the weld. Ductility does not appeal to me very much in the line of work I am doing, as we are after tremendous strength when needed.

"When a break occurs I analyze it to the best of my ability: Did the part lack sufficient strength originally? Is the design faulty? Did it break on account of fatigue? Was vibration the cause of the break? Was the job overloaded? These things must be taken into consideration before one attempts to make a repair. Otherwise, when the repair is complete one does not know whether the job will hold up or not."

OFF THE ASSEMBLY LINE

Detroit Awaits Verdict on New Cars Before Expanding Production

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DETROIT, Jan. 11.

NOW that the new models have finally been revealed to the public at the New York show and the official automobile selling season has started, the chief concern in Detroit is whether the response from motorists in the form of retail sales will be encouraging. The automobile trade is agreed that the year's course is likely to be determined by events between now and the middle of February.

Never before has the industry offered so much for so little money; despite this fact automotive executives are somewhat apprehensive whether the public's income and resources have not been so depleted during the depression that new car buying must necessarily be curtailed temporarily. On the other hand, they point with satisfaction to the average American's insatiable interest in automobiles and his desire to own a new one, and believe that among his first acts, as soon as he gets a few dollars ahead, will be to make the first payment on a new car.

With this uncertainty about the immediate future hovering over the industry, it is not surprising that manufacturers are hesitant in their attitude, that January and February production programs appear to be extremely modest and that a tendency to mark time has asserted itself.

Little Steel Business Looms

The automobile industry normally gives the steel mills its heaviest tonnage of the year during the first quarter, but at the moment little of this lucrative business looms. Yet the most comforting thought is that motor car dealers are literally stripped of stocks and the slightest pick-up in retail demand will be reflected immediately in increased factory activities and orders for steel. In the last half of 1931 retail sales exceeded production. However, there is slight indication of an intention on the part of automobile makers to put stock into dealers' hands unless actual orders justify this procedure.

Chevrolet made 59,760 cars in December, or more than half the industry's total. Its January schedule calls for 52,000 cars, February 57,000. Pontiac will assemble 10,200 cars this month.

* * *

Ford has bought steel for 10,000 bodies to be made by Briggs and Murray. Volume production of new V-eight not expected before February, possibly not until March.

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General Motors has dropped the Oakland car in favor of a Pontiac V-eight as a companion car for the Pontiac six. DeSoto has abandoned its eight to concentrate on its six. Packard has added a Twin Six and light eight to round out its line.

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There are some encouraging signs in the case of individual companies. Chevrolet made 59,760 cars in December, or 22,000 units more than its original schedule. Its output this month has been set at 52,000 cars and February at 57,000, but both of these figures are likely to be exceeded, since the company has a habit of manufacturing more cars than its early estimates call for. Studebaker and its subsidiaries are virtually certain to show a considerable gain this month over last, especially since production of the Rockne division will be increasingly felt. Graham-Paige, which recently introduced perhaps the most talked-about car of the year, reported that its output in December was the largest for that month since 1925 and the best month's production of eight-cylinder cars in the history of the company, which has been building eights for five years. General Motors' sales to dealers in December totaled 79,529 cars, against only 29,359 in the preceding month and 80,008 in December, 1930. This gain is largely accounted for by Buick and Chevrolet. Sales to consumers were 53,588 cars, compared with 34,673 in November and 57,989 a year ago. For the entire year 1931, sales to dealers were 1,074,709 cars compared with 1,174,115 in 1930. Pontiac division of General Motors has revised upward its January schedule and now expects to assemble 10,200 cars.

Ford Buys Some Steel

How soon the Ford Motor Co. will get into volume production is anyone's guess. Ford has bought steel for 10,000 four-door sedan and coupe bodies. This steel will be delivered in about two weeks to Murray and Briggs. Apparently these bodies will be made in somewhat leisurely fashion. So far as the new Ford product is concerned, a V-eight in the price range of model A will be offered as direct competition to Chevrolet and Plymouth. It is reported that the chassis will be built, however, so that it can take either a four-cylinder or eight-cylinder motor, with the four confined principally to the fleet trade. All commercial cars will be fours. Henry Ford is personally in command of activities at Dearborn, and it is freely acknowledged among Ford officials that he alone knows what program his company is to follow.

Assuredly it will be February before activities at Rouge reach the point where they will be felt by suppliers, and there seems a possibility that operations may not get into full

swing until March. Employment at the Rouge plant is now above the 50,000 mark. Murray's frame department at Ecorse still is working on the first 5000 Ford frames, putting them through at only a moderate gait. It is reported that the brake drum and hub for the two front wheels of the new Ford consist of one malleable casting, but a steel brake drum is to be used on the two rear wheels.

Among the surprises at the New York show are a Packard twin six, marking the reentry of Packard into the 12-cylinder field, and a Packard light eight to supplement the regular Packard line; a straight-eight Stutz selling at $1,620, far under the price of any previous Stutz; abandonment of the Oakland car by General Motors and the substitution for it of a V-eight Pontiac as a companion car for the Pontiac six; a Willys-Overland six selling as low as $515; and a six-cylinder Franklin with super-charger as standard equipment.

Rustless steel has made little headway in 1932 models. It is being used on the cowl bands of the Chevrolet and Pontiac and is specified for the running board molding on the Cadillac and Lincoln. Ford will continue to make lamp shells from it, but is abandoning it for the radiator shell. It is understood to have been employed experimentally for the instrument board panel on the Cadillac. Several other manufacturers are using it for small parts. Cost is a bigger factor than ever before just now, with retail car prices declining and with factories straining to reduce production expenses to the lowest possible point. This is the main reason for the inability of rustless steel to go forward. Another reason, however, is a growing trend away from bright, ornamental parts. Typical of this trend is the Graham Blue Streak, on which there is a marked absence of chromium plating. In fact, there is a studied concealment of accessories and units such as horns, parking light, radiator cap and hood latches, which might interrupt the streamline contour of the car. On the new Packards, for instance, the sides of the radiator shell are lacquered in color to correspond to the color of the body of the car, only the front being chromium-plated.

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Hudson-Essex has established a plant at Tilbury, Ont., to manufacture cars for the Canadian market. Studebaker is making Pierce-Arrow as well as its own cars in its Canadian plant. Hupp, Nash, Reo and Graham-Paige are other American companies which have established assembly plants in Canada since the Canadian government last year imposed a high duty on American cars.

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Chrysler Corpn. is planning immediate erection of a Pacific Coast assembly plant for Chrysler, DeSoto and Plymouth cars to put it in a more advantageous competitive position. One of Chrysler's handicaps in pushing the Plymouth against Ford and Chevrolet is the low costs attained by the latter two due to the saving in freight by having branch assembly plants scattered about the country.

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The Briggs Mfg. Co., largest independent automobile body maker, is diversifying its line by entering the steel refrigerator cabinet field. It has just received a large order for cabinets from the Westinghouse company.

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Campbell, Wyant & Cannon at Muskegon, Mich., one of the largest automotive foundries, is manufacturing the centrifugally cast brake drum with a steel jacket which is being marketed by Motor Wheel Corpn., Lansing, Mich., under the name "Centrifuse" brake drum. The casting operation takes place in specially designed machines in which the previously heated and fluxed steel ring revolves at a surface speed of nearly a mile a minute.

Steel wheels are standard equipment on almost all cars this year. Among some of the leading engineers is a feeling that although the wire wheel will account for the greatest volume of production, there is a possibility of a shift to disk or artillery steel wheels among manufacturers who are striving for individuality.

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Automotive Engineers To Meet in Detroit

A wide variety of topics relating to automotive progress will be discussed at the annual meeting of the Society of Automotive Engineers, to be held at the Book-Cadillac Hotel, Detroit, Jan. 25 to 29.

One of the 15 sessions will be devoted to production, with Gordon Lefebvre, consulting engineer, Detroit, speaking on the "Responsibility of Manufacturing Management." A feature of the meeting will be a discussion of streamlined body design and proposed rear engine mounting by Sir Dennistoun Burney, London, England, at the chassis session on the evening of Jan. 26. At the same session a paper on "A New Type of Engine Mounting," by N. F. Hadley, R. K. Lee and R. N. Janeway, of the Chrysler Corpn., will be presented.

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The wage rate on bar iron will remain unchanged for January and February, as based on a 1.65c. card, according to an agreement reached between the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers. The rate is based on the average selling price of bars in the November-December period.

Timken Roller Bearing Co. Increases Schedules

Improvement in the automotive industry is evidenced at the plant of the Timken Roller Bearing Co., Canton, Ohio, where increased working schedules are being put into effect for January. Although no increase is being made in the number of men employed, the plant has been put on an operating schedule of 20 days for the month of January. Increased demand for bearings both for industrial machinery and automotive requirements is responsible for this increase.

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Anthracite Gas for Heat Treating at Lower Cost

(*Concluded from page* 178)

section is actually measured and recorded, so that it is known at all times what the operating condition was.

Should the grate have an insufficient covering of ashes, the operator merely stops the rotating of the grate (this being the only part rotated in the machine) until a bed of ashes has been built up adequate for the purpose. This building up is brought about through the fact that, so long as the grates do not rotate, the action of discharging ashes, through the grate apertures at the bottom, is not taking place. Hence, as more coal is burned the ashes are retained in the producer until rotation is again resumed.

Selection of these producers and of this fuel was made by the managements purely on optimum economic grounds. It was felt that this might not be the cheapest fuel obtainable. There were other important factors involved, however, especially that of ability to obtain a dependable supply of clean, cold gas. Freedom from tar was a primary requirement. Taking all these things into consideration, the economic determination of the fuel to be used became a somewhat simple matter.

In most cases where this gas was put in to supplant city gas, it was not necessary to use a new system of piping and new nozzles or burners to take care of the four-fold increase in the quantity of gas required. In some instances additional burners were put in. For the most part, however, it meant simply substituting a larger spud in the same burner previously used, and associating with it piping of sufficient capacity to keep it always properly fed. The higher pressure used makes it possible to utilize most of the existing pipe lines.

... PERSONALS ...

R. L. SUHL, for the past three years assistant sales manager of the nickel sales department of the International Nickel Co., Inc., New York, has been appointed manager of that department, succeeding the late F. S. Jordan. Mr. Suhl joined the original International Nickel Co. in 1903, as laboratory assistant at the Bayonne, N. J., refinery. He was made superintendent of electrolytic refining five years later, and during the World War was superintendent of the oxide division. In 1920 he was transferred to the home office as a development engineer and continued as a member of the development and research department until 1928. RANSOM COOPER, JR., WALTER C. KERRIGAN and CHARLES MCKNIGHT have been appointed as Mr. Suhl's assistants. Mr. Cooper was vice-president and sales manager of the American Mond Nickel Co. before joining International Nickel in 1929. Mr. Kerrigan had previously been general manager of the United States Nickel Co. before making his present connection two years ago, and Mr. McKnight has been in charge of alloy steel development for the International company since 1922.

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WALTER C. CARROLL has again become identified with the American Sheet & Tin Plate Co., Pittsburgh, in a sales capacity. He began his business career with this organization in 1902, and served it at Detroit, San Francisco and St. Louis before going to Pittsburgh in 1908 as assistant general manager of sales. In 1921 he became vice-president in charge of sheet steel sales for the Inland Steel Co., Chicago, where he remained until August, 1927. At that time he became president of the National Association of Sheet and Tin Plate Manufacturers, serving until January, 1928, when he resigned to become president of the Oil Well Supply Co., Pittsburgh.

WALTER C. CARROLL

J. F. WIESE, new assistant vice-president of the Lukens Steel Co., Coatesville, Pa., whose appointment was announced in these columns last week.

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C. W. CHURCHILL has been promoted from general sales manager of the Buick Motor Co. to vice-president in charge of sales, and GEORGE H. WALLACE from assistant sales manager to general sales manager.

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F. L. MCMANUS has been appointed vice-president in charge of traffic of the General Refractories Co., Philadelphia. D. M. THORPE has been made vice-president in charge of sales, and L. TSCHIRKY, vice-president and assistant to the president.

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HERBERT S. WHITON has been appointed chief mechanical engineer of the Byllesby Engineering & Management Corpn., Chicago, succeeding H. BOYD BRYDON, who retired last year. Mr. Whiton has been identified with the Byllesby company since 1923.

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J. D. HARRISON, district manager of the Chicago office from 1922 to 1929 of the Combustion Engineering Corpn., New York, has been reappointed to that position. He succeeds HUGH R. CARR, who has been transferred to the home office as manager of stoker sales.

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LEE F. BERTHOLD, heretofore sales manager and associated with the sales organization of the Louden Machinery Co., Fairfield, Iowa, for the past 13 years, has severed his connection with that company to organize the Industrial Handling Co., Toledo, Ohio.

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ALOIS HAUSER has resigned as assistant works manager in charge of engineering for the bearing factories of the Timken Roller Bearing Co. and the steel mills of Timken Steel & Tube Co., Canton, Ohio. He has held this position since 1920 and has had charge of the expansion work in the bearing factories and has supervised the development program which the Timken company has completed during the last few years in its alloy steel division. Mr. Hauser came to the United States in 1907 from Austria, where he served as master mechanic in a steel plant. His first connection in the United States was with the engineering department of the United States Steel Corpn., which he served for nine years in the Duquesne and South Chicago plants as departmental supervisor. He then became identified with the Bethlehem Steel Corpn., as efficiency engineer in the Coatesville and South Bethlehem plants. With the Timken expansion program completed, Mr. Hauser plans to take a much needed vacation.

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E. G. STEDMAN has resigned as superintendent of the open-hearth and electric furnace department of the Timken Steel & Tube Co. after having been connected with the company for the past 14 years.

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HENRY H. PECK, formerly with the Standard Steel Works Co., Burnham. Pa., has become manager of sales of Lukenweld, Inc., a division of the Lukens Steel Co., Coatesville, Pa. For many years Mr. Peck has been identified in a sales capacity with the

HENRY H. PECK

foundry business. He succeeds JOHN S. BLEECKER, formerly in charge of sales for Lukenweld, Inc. Mr. Bleecker has been appointed manager of sales research and advertising for Lukens Steel Co. and its divisions, Lukenweld, Inc., and By-Products Steel Corpn.

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A. M. WORTLEY, of the Philadelphia sales staff, American Rolling Mill Co., Middletown, Ohio, has been appointed assistant manager in the Philadelphia office, which will hereafter be under the supervision of the New York office, in charge of C. M. Spear. WILLIAM S. STEPHENSON, formerly district manager of sales in Philadelphia, has resigned.

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CLARENCE E. SEARLE, general representative, Allis-Chalmers Mfg. Co., Milwaukee, has resigned, effective Jan. 31, to assume new duties with an Eastern company, the name of which is withheld for the present. Mr. Searle joined the Allis-Chalmers company in 1907 and has directed its entire sales activities since 1913. He will be succeeded by L. W. GROTHAUS, at present assistant manager, electrical department.

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JAMES CAVEN FOSTER, for a number of years assistant manager of sales of wire products for Jones & Laughlin Steel Corpn., Pittsburgh, has been made manager of sales in that division, succeeding E. D. BATCHELOR, who has been placed in charge of a special department in general sales.

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J. B. NORDHOLT and C. C. SMITH, formerly of the Toledo Steel Casting Co., have been elected vice-presidents and directors of the Industrial Steel Casting Co., Toledo, of which JOSEPH L. TILLMAN, SR., is president. Mr. Smith has been active in foundry organization work and formerly served as president of the Ohio Foundrymen's Association.

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WILLIAM L. HEPPNER, formerly with C. C. Kawin, Chicago, as foundry advisor and more recently foundry superintendent and sales representative of the Euclid Foundry Co., Cleveland, has been made foundry supervisor and sales representative of the National Rubber Machinery Co., Akron, at its Banner machine plant at Columbiana, Ohio.

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WILLIAM E. UMSTATTD has been made executive vice-president of the Timken Roller Bearing Co., Canton, Ohio. He has been with the Timken organization for 13 years, during the last two years as factory manager.

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HENRY F. DEVENS has been elected president of the Oliver Iron & Steel Corpn., Pittsburgh. Since 1930 vice-president and general manager of sales, he was for six years previous

HENRY F. DEVENS

to that vice-president in charge of operations of the Morris & Bailey division of that company. Mr. Devens first became identified with the iron and steel industry when he accepted a position in the foundry department of the Yale & Towne Mfg. Co., in which he rose to the position of purchasing agent. In 1900 he went in a similar capacity with the National Cash Register Co., Dayton, Ohio. Six years later he associated himself with the sales department of the Superior Steel Co., Pittsburgh, from which he resigned in 1923 as vice-president.

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T. P. DRAPER, who, until August, 1931, was vice-president in charge of operations for the Sharon Steel Hoop Co., Sharon, Pa., has been appointed general manager of the Steubenville, Ohio, works, Wheeling Steel Corpn., succeeding F. C. SCHWARTZ, who has resigned. The change was effective Jan. 1 and Mr. Draper will be in active charge of all production and management at Steubenville immediately. Prior to his position with the Sharon company, he was identified for a number of years with the old Trumbull Steel Co., Warren, Ohio, and also with the Youngstown Sheet & Tube Co. In his new capacity his headquarters will be at Steubenville.

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J. K. B. HARE, who has recently been identified with the New York district office of the Westinghouse Electric & Mfg. Co., has been appointed transportation manager in the Central district, with headquarters in the Grant Building, Pittsburgh. He will have charge of the company's transportation matters in Michigan, Ohio, Kentucky, western Pennsylvania, and part of West Virginia. Mr. Hare has been associated with the Westinghouse company since 1919, and prior to service in the World War was identified for five years with the Westinghouse Air Brake Co., Wilmerding, Pa.

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FRANKLIN H. FOWLER has been elected president of Foote Brothers Gear & Machine Co., succeeding JAMES F. GRISWOLD, who will devote his time to other business interests.

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BARNEY MAGEN, formerly of the New York office of Frank Samuel & Co., Philadelphia, is now with the Grace Iron & Steel Co., scrap dealer, 815 Broadway, Brooklyn.

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W. A. TOBLER, who has been manager of the Winchester Repeating Arms Co., New Haven, Conn., has been made vice-president of the Remington Arms-Union Metallic Cartridge Co.

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JOHN L. BUNCE, formerly assistant service manager of Pratt & Whitney Aircraft Co., has been made service manager, to succeed BENJAMIN H. GILPIN. Mr. Gilpin, who has been factory manager as well as service manager, will devote all his time to the factory management.

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DR. H. W. GILLETT, director of Battelle Memorial Institute, Columbus, Ohio, and L. W. Spring, chief chemist and metallurgist, Crane Co., Chicago, have been awarded the W. H. MacFadden and John A. Penton gold medals by the American Foundrymen's Association, for their outstanding services to the foundry industry. The presentation will take place at the annual convention of the society at Philadelphia in May.

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WILLIAM GROVE, formerly with the Ingersoll Milling Machine Co., Rockford, Ill., has become identified with the sales engineering department of William Sellers & Co., Inc., Philadelphia, to specialize on planer type milling machines and floor borers.

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CHESTER H. LANG, formerly assistant manager of the publicity department and then comptroller of the budget of the General Electric Co., has been appointed manager of the publicity department to succeed MARTIN P. RICE, who has retired after more than 37 years of service with the company. Mr. Lang was graduated from the University of Michigan in 1915 and has been identified with General Electric since 1919.

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HARRY D. BARROWS has rejoined the staff of the Industrial Plants Corpn., New York.

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C. B. DUGAN has been appointed district manager of the Los Angeles office of the National Steel Fabric Co., Pittsburgh, and H. M. WILSON has been assigned to a similar post in the Chicago office.

OBITUARY

FRANK D. HAMLIN, vice-president and general manager of the Earle Gear & Machine Co., Philadelphia, of which he was one of the founders, died suddenly from a cerebral hemorrhage at his home in that city, Jan. 9. Mr. Hamlin was born Jan.

F. D. HAMLIN

16, 1863, at Waverly, N. Y. He served an apprenticeship with the Gleason Works, Rochester, N. Y., which at that time built a general line of machine tools. His son, Albert J. Hamlin, is connected with the Earle Gear & Machine Co.

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HAMILTON L. LINDSAY, president, Lindsay Wire Weaving Co., Cleveland, died Jan. 8, after an illness of several months. He was born in Scotland and when a young man went to Cleveland. In 1903 he invented a machine for weaving wire cloth and organized the company of which he had since been the head. He was also president of the Niagara Wire Weaving Co., Niagara Falls, Ont.

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GEORGE EDWARD ABBOTT, president of the Abbott Ball Co., Hartford, Conn., died at his home in West Hartford on Jan. 1. He was born in Gananoque, Ont., 67 years ago and went to New Britain, Conn., in 1890. Six years later he became identified with the New Departure Mfg. Co., of which he was superintendent until 1908. He then organized the company of which he was president at the time of his death.

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W. B. CHAPMAN, formerly president of the Chapman Engineering Co., Mount Vernon, Ohio, died in Chicago on Dec. 16. He was the inventor of the gas producer which bears his name and which is now built by the Cooper-Bessemer Corpn. Mr. Chapman went with the Surface Combustion Co. when that company absorbed the Chapman-Stein Co.

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CHARLES F. DAVIS, formerly secretary-treasurer of the W. P. Davis Machine Co., Rochester, N. Y., died Dec. 24 in a hospital in that city as the result of injuries incurred when he was run down by an automobile. He was 71 years old.

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WILLIAM D. POMEROY, vice-president and general manager of Goulds Pumps, Inc., Seneca Falls, N. Y., died suddenly on Jan. 6, aged 57 years. He was graduated from Cornell University with an engineering degree in 1895. Mr. Pomeroy became associated with the Goulds company in 1907 as works manager. Eight years later he was made general manager and for the past several years had been a vice-president of the company, general manager and a director. He held a number of patents for mechanical and electrical devices and last year shared with Prof. Herman Diederichs of Cornell University the Melville award of the American Society of Mechanical Engineers.

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WALTER N. JOHNSON, president, Birmingham Boiler & Engineering Co., Birmingham, died Jan. 6. He had been in the iron and steel business in Birmingham for 30 years. He organized the Johnson & Barry Steel Co. in 1916, this having been succeeded by the Johnson & Thompson Steel Co. Five years ago he organized the Birmingham Boiler & Engineering Co.

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BRIG. GEN. HARRIS ANSE WHEELER, retired Indian fighter and manufacturer, died at his home in Highland Park, Ill., on Jan. 7, aged 81 years. He had been engaged in the manufacture of the Wheeler car chairs, reclining seats used in railroad coaches.

HUGO P. TIEMANN, assistant metallurgical engineer of the Carnegie Steel Co., whose death was announced in these columns last week, gained prominence in the industry through his authorship of an authoritative encyclopedia on the industry entitled *Iron and Steel.*

W. A. YOUNG, who died on Dec. 23, as announced in these columns two weeks ago, had been chief engineer of the Harnischfeger Corpn., Milwaukee, for 21 years.

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JULIUS ROSENWALD, chairman of the board of Sears, Roebuck & Co., Chicago, died Jan. 6, after a long illness. He heavily endowed the Rosenwald Industrial Museum, which is to be housed in the reconstructed Fine Arts Building in Jackson Park, Chicago. He was 69 years old.

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JOHN W. LEES, retired vice-president of the Inland Steel Co., died Jan. 3 at his home in Indiana Harbor, Ind. Mr. Lees, who was 68 years old, was vice-president in charge of operations for his company at Indiana Harbor until he retired about 10 years ago because of poor health. He went with the Inland company in 1903 as superintendent of the Indiana Harbor works.

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HERBERT W. WOODWORTH, general manager and treasurer of the American Tool & Machine Co., Boston, died at his home in Braintree, Mass., on Jan. 1. He was born in Braintree 61 years ago.

..THE IRON AGE..

(ESTABLISHED 1855)

ANNOUNCEMENT

IN taking over the editorial direction of THE IRON AGE, I recognize the high standards of journalism that have been maintained by W. W. Macon, A. I. Findley and the editors who preceded them. The standards of the past will be jealously guarded. At the same time no effort will be spared in meeting the challenging problems of the future.

THE IRON AGE was originally dedicated to aid the upbuilding of our country's industrial capacity, in the days of expanding needs. Today in common with its industry and all industry it is concerned with keeping our present capacity profitably employed, capacity being taken to include men as well as machines.

This cannot be achieved by going back to the horse-and-buggy days. Greater consumption of the goods that our plants are capable of producing implies of necessity larger mass purchasing power. And this cannot be had by reducing efficiency or abandoning the gains that science and mechanization have brought us

The desired adjustment between production and consumption will be attained when the perplexed and confused thinking of today crystallizes, as it will, into a clearer conception of the relationships of machinery, employment, investment, distribution, credit and consumption. It will come when the efficiency gains of industry are protected from dissipation through speculative manipulation and wasteful investment of capital, when modernization reduces costs so that new increments of values may be passed to the employer, the employed and the consuming public and when new wants are so cultivated as to absorb labor and provide additional outlets for materials and equipment.

Unmistakable signs are pointing to the coming of a new and better day for our own and for other industries, based upon the costly lessons now being learned by all of us. THE IRON AGE will endeavor to do its part, constructively and intelligently, in helping to bring this about.

John S. Vaughan

Revising Views of Activity

ENTIRELY from the force of circumstances we have been revising our views of many things and getting new viewpoints. There is one, as to industrial activity, that is more or less susceptible of arithmetical consideration, using the Federal Reserve Board's index of industrial production, manufacturing and mining.

This index showed a steadiness of movement to June, 1928, that should have directed more attention to the bulge that came afterward. From the viewpoint of July 1, 1928, activity reached "normal" on Oct. 1, 1922. There was an increase of 2¾ points a year to 109 for June, 1928. The rate of increase, figured on a compound interest basis, was a rapid one, representing a doubling in a quarter century when the contemporary population growth was at a rate of doubling in a half century.

From June, 1928, however, to June, 1929, there was an increase to 127, or by 18 points in a year, over six times the preceding rate, which was amply strong. The popular reaction was simply "So much the better!" We were getting around to showing what we really could do.

When things went the wrong way we at first attributed it to a passing disturbance. We might have to bridge a gap or make up for the recent excess. It was a simple matter to count up the number of points of excess the index showed during the bulge after the middle of 1928, pay the bill by having a trough and then go along. Later we grudgingly admitted that there was more to be compensated than we thought. We blamed part of our trouble on the rest of the world, whose influence we had previously refused to admit. Finally, when there was too much for our comprehension, biased as it had been by seven years of plenty, we became scared and did foolish things, which accentuated the scare.

Continuance of the rate prevailing to June, 1928, ignoring the subsequent bulge, would have made an index number of 118 for last October, but the number had actually fallen to 73. The matter now to be determined is how much writing down we must do, or to what extent 73 is below what we should count on for the altered conditions. The pendulum has swung too far, but of that fact many have been convinced for a long time.

AT a time when the financial stress is making it difficult for industry to maintain research work on its own account, it is reassuring to learn of the effective work done by the research committee of the American Society of Mechanical Engineers. Its

standing committee on the subject has no less than 29 cooperative committees for whose programs of activities $53,000 was obtained in 1931 from industry itself and from the Engineering Foundation, as against $48,000 in 1930. The society, in addition, contributed about $14,000 for administrative and secretarial assistance in the past year.

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More Steel-Finishing Capacity

FINISHING capacity of the steel industry has increased much more in the last couple of years than steel-making capacity. Theoretically, a part of this extra increase could be assigned to the steel companies desiring to provide more flexibility, to take care of changes in the relative demand for different products, but practically, when there is such an excess of steel-making capacity over prospective demand in the nearby future, it may be ascribed chiefly to new products and new methods of rolling, rendering certain old classes of equipment less likely to be engaged.

For example, the most outstanding class of new construction has been in strip mills, and perhaps the end is not yet. And there are chances of developments occurring in quite another direction, that of erection of general-purpose mills, fast running and equipped along modern lines, mills of moderate sized tonnage with a wide range of possible products. The smallness of individual orders lately, and the promptness in delivery required furnish a strong suggestion for such machinery.

For many years, and until recently, it seemed to be a fair estimate that the total steel-finishing capacity of the industry was 20 to 30 per cent in excess of steel-making capacity. Taking 25 per cent for convenience, that meant that if there were capacity to make steel ingots of 50,000,000 tons a year, the aggregate finishing capacity would be 62,500,000 tons of ingots. A 100 per cent ingot production would be accompanied by an average operation of finishing departments of 80 per cent. That alinement was rational and necessary, for the industry had a heavy investment up through the steel ingot and needed flexibility in finishing to meet varying conditions as to relative demand for the different products. Actual capacity estimates furnished by steel companies did not fully show the situation as finishing department estimates were scaled down part way to conform to ingot supply.

The summary published in THE IRON AGE of Jan. 1, 1931, page 95, showed 66,361,700 tons ingot capacity and 55,902,200 tons capacity in finished products. Production statistics for several years past have shown finished rolled steel at 74 per cent of ingots, whereby the capacity figures cited would show 14 per cent excess, i.e., the finishing departments could take 114 tons of ingots against 100 tons of ingots actually available. Full allowance, however, would probably have made a showing of around 25 per cent excess.

With the large rolling mill capacity completed in the last year or so and with no little new construction still in progress, but practically no more steel-making capacity under construction, the former excess is being materially increased and has lately been estimated by some observers at 35 to 40 per cent.

A practical bearing of this point is in surveys of proportionate engagement of the steel mills. Finishing departments will average much lower percentages of engagement than steel-making departments. Assuming only one-third excess of finishing capacity, there would be three-fourths average engagement when steel-making capacity was fully employed, while at a 32 per cent ingot engagement there would be 24 per cent finishing engagement.

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Bootleg Gasoline

ABOUT $500,000,000 per year is collected in gasoline taxes and about $50,000,000 that ought to be paid is evaded. Such is the estimate of W. T. Holladay, president of the Standard Oil Co. of Ohio and head of the marketing division of the American Petroleum Institute. Whenever the tax rate is above 3c. a gallon, the temptation to evade is strong.

The evasion occurs chiefly in the following ways: Abuse of refund and exemption privileges; adulteration of motor fuel with non-taxable products; trucking gasoline across State lines, usually at night; diversion of ostensible out-of-state shipments to the same State; making false bills of lading, and operation of dummy sales corporations.

This is a grave competition against the reputable refiners of gasoline and they are united in cooperating with the State authorities to eliminate this evil. There is, however, a lesson to the State legislators to the effect that they should not make too high this tax that is so lucrative and has been supposed to be so easily collectible.

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Casuals

WHEN the history of the depression is written, one of the bright chapters of an otherwise dark book will deal with the sharing of jobs. The principle of job rotation or work-spreading, however, should not be confined to the wage earners. The four other fifths of total employment—clerical workers and stenographers—should be given the privilege also of sharing work with others—so, too, should the large field of civil service employees.

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HOW remarkable have been the economies effected in industry is given a quantitative measure that is almost incredible by R. E. Baker, secretary-treasurer of Arthur G. McKee & Co., Cleveland. Writing in the Cleveland *Plain Dealer* he asserts there is one steel concern that can cover production expenses, overhead and fixed charges when operating at only 35 per cent of capacity and in addition leave small earnings for the common stockholders. A 30 per cent rate of

John H. Van Deventer, Editor of The Iron Age, Has Had Long Publishing and Manufacturing Career ♦ ♦ ♦

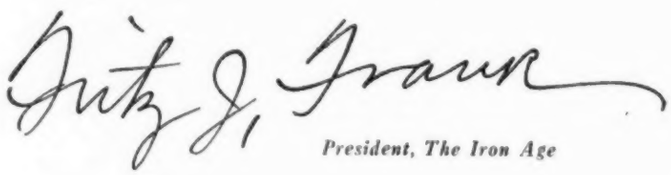
JOHN H. VAN DEVENTER, who becomes editor of THE IRON AGE with this issue, brings to this publication a long experience not only in the field of publishing and editing but in manufacturing as well. After his graduation from Cornell University in 1903 as a mechanical engineer, Mr. Van Deventer engaged in manufacturing work, and from 1905 to 1907 was superintendent of production of the Goulds Mfg. Co., Seneca Falls, N. Y., now Goulds Pumps, Inc. From 1907 to 1914 he was general superintendent and factory manager of the Buffalo Forge Co., Buffalo.

Upon leaving the manufacturing field, Mr. Van Deventer became associate editor of the ***American Machinist*** and was editor of that publication from 1917 to 1920. While serving in that capacity he was summoned to Washington upon the entrance of the United States in the World War and assisted in the organization of the United States Ordnance Department. He was honorably discharged in 1918 with the rank of major. After the war he organized the Army Ordnance Association.

In 1921 Mr. Van Deventer became president of the Engineering Magazine Co., New York, and editor of its two publications, ***Industrial Management*** and ***Industry Illustrated,*** which were sold in 1926 to the McGraw-Hill Publishing Co., to which Mr. Van Deventer returned as consulting editor. He joined THE IRON AGE organization in 1930 in a consulting capacity and has contributed many articles to the pages of this publication during the past year and a half.

He has been prominent in the affairs of business publishers for many years, having served as chairman of the New York Business Publishers' Association in 1923 and 1924 and president of that organization in 1924 and 1925. Two years ago he presented a paper on "Mass Production" at the World Engineering Congress in Tokio, Japan.

JOHN H. VAN DEVENTER



President, The Iron Age

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activity, he says, fails to meet production and overhead expenses by only a small margin. How promising should be the results with any sizable expansion in business!

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HOW great have been the checks to consumption is evinced in the case of the metals, the present rate of production for some of these being only 40 per cent of that in 1929, not to mention steel at around 35 per cent. The curtailment, in respect to copper, lead and zinc, has been much more in degree in the United States than it has been in Europe, although the many political articles tend to produce the impression that industry in Europe is nearly prostrate (which is not borne out by the statistics).

According to the Interstate Commerce Commission the greatest loss to the railways has been in the passenger business. We can see something formidable in the competition of the truckmen, and in the short-distance passenger service that is offered by the busmen, but we can not imagine anyone traveling from New York to Boston in a bus rather than the far more comfortable railway train if the railways would make the latter reasonably permissible. The cost of a round trip to Boston is just about twice what it was in 1916. People travel by bus because it is so much cheaper. It is said that the bus lines escape taxation, but certainly they do not escape taxes on the gasoline they use.

SUMMARY OF THE WEEK'S BUSINESS

Steel Industry Awaits Buying Revival; Price Weakness Continues

Expectations of Increasing Tonnage Largely Center on Automobile Makers and Railroads—Some Quotations Lower

ALTHOUGH its expectations were conservative, the steel industry is disappointed by the lack of significant improvement in business since the year-end lull. There is still hope, however, that late January or February will bring a measure of seasonal recovery.

Ingot output has gained only slightly for the country as a whole, being estimated at a little above 25 per cent, compared with 24 per cent last week. The Pittsburgh and Cleveland districts have each gained three points to 23 per cent for the former and 35 per cent for the latter, but elsewhere there has been no noteworthy change.

Such gains as have been made either in the volume of steel bookings or in operations are chiefly in bars, sheets and strip steel for the automobile industry. The Ford Motor Co. has released some contracts to parts makers, and these companies have placed steel orders, but no important tonnage has come directly from the Ford company, whose schedule for volume production of new models may not get fully under way until late February or March. The automobile industry as a whole seems to be awaiting the public's verdict on new cars now being exhibited before committing itself to a marked expansion in manufacturing activities.

THE almost-certain acceptance by the railroad brotherhoods of wage reductions is reviving expectations of increased railroad buying, at least for mandatory replacements and repairs. The Erie will order 31,400 tons of rails this week, and inquiries from other roads are expected shortly. The Northern Pacific has ordered 150 steel hopper cars.

Of immediate importance in steel mill schedules is the probable placing of contracts this week for several hundred thousand tons of tin plate by the two leading can companies. This business has been delayed beyond its usual time pending price negotiations and a close ascertainment by the can companies of probable requirements, which are said to have been finally estimated at only slightly below those of last year. This business is usually distributed in November or December, and its absence from the books last month was presumably an important factor in the decline of 198,538 tons in the unfilled orders of the United States Steel Corpn., when December ordinarily shows a sharp gain. Tin mill rollings probably will be stepped up soon as a result of this business.

Other lines of steel consumption have developed no marked change. Orders for plates for oil tanks have been more plentiful at Chicago, and general inquiry at Chicago has gained, but in no section is there yet an indication of a strong revival. Many industrial plants which were shut down prior to the holidays have been slower to resume production than would be the case were there a pressing demand for their products, but some of them are getting under way and will need to replenish inventories.

TO what extent price weakness is a retarding factor in an already dull situation is difficult to determine, but, if low price levels were all that were needed to encourage buying, a turning point could easily be visualized for the near future. Many quotations are considerably below the non-profitable levels of last year, with no stabilization in sight except in the Chicago district, where mills have apparently established a $2 advance on bars, plates and shapes to 1.70c. a lb.

In other districts, however, declines or weakness continues. No. 24 gage hot-rolled annealed sheets have been sold to barrel makers at 2.15c., Pittsburgh, a total drop in the past month of $5 a ton, and a reduction of $3 a ton on vitreous enameling sheets is the second of that amount in a few weeks. Hot-rolled strip steel is generally available at 1.40c., Pittsburgh, for wide and 1.50c. for narrow, a decline of $1, with further concessions in some special instances. Semi-finished steel is $1 lower at Youngstown and Cleveland. Bolts and nuts are weak, an extra 10 per cent discount having been given to large buyers. Even tin plate, one of the most stable of all steel mill products, has been subject to deeper concessions than usual, although the official price is unchanged at $4.75 a base box.

In pig iron there has been a decline of $1 a ton on the Alabama product for shipment to the North, which brings THE IRON AGE composite pig iron price down to $14.63 from $14.79, where it has been since mid-December. It is now the lowest since October, 1915. In heavy melting steel scrap, however, there has been strength at Pittsburgh on a sale of 8000 tons, which increases THE IRON AGE scrap composite price to $8.50 from $8.47, the low point of the depression. Changes in steel prices are not reflected in THE IRON AGE composite for the finished products, it remaining at 2.052c. a lb. Copper has been advanced ⅛c. a lb.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Jan. 12, 1932	Jan. 5, 1932	Dec. 15, 1931	Jan. 13, 1931
No. 2 fdy., Philadelphia	$15.64	$15.64	$15.51	$17.76
No. 2, Valley furnace	15.50	15.50	15.50	17.00
No. 2 Southern, Cincinnati	14.82	14.82	14.69	14.19
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	16.50	16.50	16.50	17.50
Basic, del'd eastern Pa.	16.25	16.25	16.25	17.25
Basic, Valley furnace	15.00	15.00	15.00	17.00
Valley Bessemer, del'd P'gh	17.89	17.89	17.76	19.26
Malleable, Chicago*	16.50	16.50	16.50	17.50
Malleable, Valley	16.00	16.00	16.00	17.50
L. S. charcoal, Chicago	23.17	23.17	23.04	27.04
Ferromanganese, seab'd carlots	†75.00	†75.00	†75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	28.00	28.00	29.00	30.00
Sheet bars, Pittsburgh	28.00	28.00	29.00	30.00
Slabs, Pittsburgh	28.00	28.00	29.00	30.00
Forging billets, Pittsburgh	*34.00*	35.00	35.00	36.00
Wire rods, Pittsburgh	37.00	37.00	35.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.50	1.50	1.55	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.50	1.50	1.60	1.65
Bars, Chicago	**1.70**	1.60	1.60	1.70
Bars, Cleveland	1.55	1.55	1.65	1.70
Bars, New York	1.85	1.85	1.93	1.98
Tank plates, Pittsburgh	1.50	1.50	1.55	1.65
Tank plates, Chicago	**1.70**	1.60	1.60	1.70
Tank plates, New York	1.798	1.798	1.83	1.93
Structural shapes, Pittsburgh	1.50	1.50	1.50	1.65
Structural shapes, Chicago	**1.70**	1.60	1.60	1.70
Structural shapes, New York	1.76775	1.76775	1.80¼	1.90½
Cold-finished bars, Pittsburgh	2.00	2.00	2.10	2.10
Hot-rolled strips, Pittsburgh	*1.40*	1.45	1.50	1.55
Cold-rolled strips, Pittsburgh	1.95	1.95	2.00	2.25

Finished Steel

Per Lb. to Large Buyers:	Jan. 12, 1932 Cents	Jan. 5, 1932 Cents	Dec. 15, 1931 Cents	Jan. 13, 1931 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.40	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.40	2.40	2.50	2.45
Sheets, galv., No. 24, P'gh	2.80	2.80	2.90	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.90	2.90	3.00	3.00
Hot-rolled sheets, No. 10, P'gh	1.60	1.60	1.65	...
Hot-rolled sheets, No. 10, Chicago dist. mill	1.75	1.75	1.75	...
Wire nails, Pittsburgh	1.95	1.95	1.90	1.90
Wire nails, Chicago dist. mill	2.00	2.00	1.95	1.95
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., P'gh	2.60	2.60	2.55	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.60	2.60
Tin plate, 100-lb. box, P'gh	$4.75	$4.75	$4.75	$5.00

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	**$10.25**	$10.12½	$10.25	$11.25
Heavy melting steel, Phila.	7.50	7.50	7.75	10.50
Heavy melting steel, Chicago	7.75	7.75	7.75	10.25
Carwheels, Chicago	8.50	8.50	8.50	11.25
Carwheels, Philadelphia	11.50	11.50	11.50	13.50
No. 1 cast, Pittsburgh	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia	10.00	10.00	10.00	12.00
No. 1 cast, Ch'go (net ton)	*7.50*	8.50	8.50	9.50
No. 1 RR. wrot., Phila.	9.50	9.50	9.50	12.50
No. 1 RR. wrot., Ch'go (net)	6.50	6.50	6.50	8.50

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt	$2.25	$2.25	$2.40	$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	**7.62½**	7.37½	6.87½	10.37½
Electrolytic copper, refinery	**7.25**	7.00	6.25	9.75
Tin (Straits), New York	**22.00**	20.75	21.62½	25.75
Zinc, East St. Louis	*3.05*	3.12½	3.15	4.00
Zinc, New York	*3.42*	3.47½	3.50	4.35
Lead St. Louis	3.55	3.55	3.55	4.55
Lead, New York	3.75	3.75	3.75	4.75
Antimony (Asiatic), N. Y.	*6.00*	6.15	6.25	7.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Jan. 4, 1932	2.052c. a Lb.	$14.63 a Gross Ton	$8.50 a Gross Ton
One week ago	2.052c.	14.79	8.47
One month ago	2.095c.	14.79	8.58
One year ago	2.142c.	15.90	11.33
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Steel Scrap HIGH	Steel Scrap LOW
1931	2.142c., Jan. 13	2.052c., Dec. 29	$15.90, Jan. 6	$14.79, Dec. 15	$11.33, Jan. 6	$8.50, Dec. 29
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

Pittsburgh Operations Up Moderately, Though Tonnage Is Disappointing

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Volume of business thus far in new year is disappointing.

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Steel ingot operations at 23 per cent in Pittsburgh district, a slight gain, and virtually unchanged at Youngstown and Wheeling.

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Some further weakness in prices, particularly in sheets and strip steel.

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Sale of 8000 tons of No. 1 heavy melting steel strengthens scrap market.

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PITTSBURGH, Jan. 12.—While miscellaneous releases for finished steel products have shown some improvement in number during the last week, aggregate volume is still disappointing to most companies. Except in the case of the automobile industry, forward buying is also very limited, and miscellaneous consumers seem to be awaiting a change in general business before making significant commitments. Purchases by the railroads are expected after the desired wage adjustment is made, but it is pointed out that the additional revenues made available will be sufficient this year only for mandatory replacements and repairs which have already been neglected for nearly a year. Even under these circumstances, purchases of rails, accessories and rolling stock in even half of normal volume would be of great benefit to the steel industry.

Steel buying and releases from the automobile industry last week were considerably better than they have been in spite of the Ford Motor Co.'s failure to participate in an important way. However, sustained releases from the motor car builders are not expected until next month.

Steel ingot production in the Pittsburgh district this week has been advanced to about 23 per cent of capacity. Finishing mill schedules are little higher except in the case of strip steel and sheets, but raw steel inventories had been allowed to fall very low and gradually increasing requirements are expected in the next few weeks. In the Wheeling district last week's average is being maintained, with an upward tendency in evidence.

Lack of buying has left the price structure on finished steel products generally unchanged, although hot-rolled strips and hot-rolled annealed sheets are weaker. Quotations on bars have been clarified at a range of 1.50c. to 1.60c., Pittsburgh, the lower figure applying to large buyers. The 1.60c. price is less common on plates and seldom encountered on shapes. Quotations on wire products are being exceptionally well maintained, and a growing amount of business is being booked at the recently established figures of $1.95 a keg, Pittsburgh, on nails and 2.20c. a lb. on manufacturers' wire.

A comparatively large purchase of No. 1 heavy melting steel at $10.50 has given renewed strength to the scrap market.

Pig Iron

Market activity shows no improvement, with sales confined principally to carload lots for immediate shipment. None of the smaller buyers in the district are willing to make forward purchases, and contract users are generally covered for many weeks. Prices are unchanged, with foundry iron quoted at $15.50, Valley furnace, and $16.50, Pittsburgh. Bessemer and malleable are holding at $16, Valley, and $16.50, Pittsburgh. The market on basic is nominal at recent levels. No merchant stacks in the district are active; two are banked.

Rails and Track Supplies

No inquiry for rails has appeared except that of the Erie Railroad for 40,000 tons. Track accessories are also quiet, and shipments against old contracts are practically completed. The railroads are not expected to do any forward buying until their wage difficulties are straightened out.

Bolts, Nuts and Rivets

Bolts and nuts are quoted at 73, 10 and 10 per cent off list, and large rivets at $2.25, Pittsburgh. Some buyers have secured an extra 10 per cent on bolts and nuts.

Bars, Plates and Shapes

Releases show very little improvement over December levels, but new buying seems to be slightly more active. Structural awards are holding up fairly well for this time in the year, but competition between fabricators is very keen and prices are generally unprofitable. The larger shops have moderate backlogs, but the smaller interests are badly in need of business. The reinforcing bar market is dull, but some tonnage for spring award is coming out. Demand for merchant bars continues very dull, although a little buying by the automobile industry developed last week. This also improved business in alloy steel bars.

Prices are unchanged, with bar makers quoting 1.60c., Pittsburgh, on the general run of orders, and 1.50c. to large buyers. Little effort is being made to get more than 1.50c. for any class of trade on plates and shapes, but deviations from this figure are apparently less frequent than they were.

Cold Finished Steel Bars

Specifications this month have shown little improvement over those of December, and scarcely any new buying is reported. The price is well maintained at 2c., Pittsburgh.

Tubular Goods

Pipe makers did not experience the usual January upturn in specifications, and, even though jobbers' stocks are light, they are cautious about replenishing them. Very little of the district's pipe capacity is active, although most mills are able to operate for one or two days each week. No line pipe inquiry has appeared, but a local producer has booked 3000 tons of 8-in. seamless material for an oil producer in Oklahoma.

Sheets

Releases were slightly heavier last week, and operations have been stepped up a few points in some plants. Most of the increased tonnage came from the automobile industry, although no important orders from the Ford Motor Co. have yet been reported. The less important sheet-consuming lines are taking no more steel than they were in the first half of December. A fair tonnage is going into car repair work in railroad shops and users of track plate are taking comparatively heavy tonnages. Electric refrigerator makers are showing no interest in their spring requirements. Electrical sheets are very quiet. The industry is operating at 20 to 25 per cent this week.

Prices generally have not given ground further, but little new business has been placed to test them. Barrel makers are reported to have received a price of 2.15c., Pittsburgh, on special hot-rolled annealed stock, but 2.25c. is still considered the usual minimum on this product.

Tin Plate

Operations are maintained at slightly over 40 per cent of capacity, but reductions are expected before the end of the month. Most of the anticipated tonnage of the large makers has been rolled, although some of this has been delayed because of the delay by two large consumers in allocating their 1932 tonnage. The market is still troubled by price cutting, but the official price is unchanged at $4.75 a base box, Pittsburgh.

Strip Steel

In spite of the dearth of buying, strip prices continue very weak, and open quotations on hot-rolled material are $1 a ton lower. On widths of 6 in. to 24 in., 1.40c., Pittsburgh, is available to large buyers, with 1.50c. not uncommon on the narrow sizes. Even these figures have been shaded in some instances. Automotive tonnage has been responsible for most of the price weakness. Cold-rolled strip is quotable at 1.95c. to 2.05c., Pittsburgh, subject to concessions. Operations have not changed materially, averaging about 20 per cent on hot-rolled and 15 per cent on cold-rolled.

Semi-Finished Steel

With little buying to test prices, the market here is unchanged from last week, with billets, slabs and sheet bars nominally quoted at $28 a ton, Pittsburgh, though $1 a ton lower is quoted at Cleveland and Youngstown. Sharp concessions are occasionally encountered in sheet bars. Forging billets are quoted at $34 a ton, and wire rods at $37, the latter price being well maintained on forward business.

Wire Products

While specifications have fallen off since the first of the year because of heavier December releases in anticipation of a price increase, reports from the trade are rather encouraging, and indicate one of the most stable markets in several years. The advance was not considered drastic, in view of recent conditions, having ranged from $1 to $3 a ton on most of the principal merchant items. Shipments against these contracts are to be completed this week. Orders for manufacturers' wire from the automobile industry are slightly heavier, but this line is rather quiet in other respects. Prices are very well maintained at 2.20c. a lb., Pittsburgh, for manufacturers' wire, and $1.95 a keg for nails.

Coke and Coal

Labor difficulties have again appeared in the coal industry, but have been confined thus far to one company. Demand shows no change. No inquiry is appearing for furnace coke, which is still quoted at $2.25 to $2.35 a ton, Connellsville. Shipments of the foundry grade have been a little heavier since the first of the year.

Refractories

Prices on fire clay brick have been reduced $2 per thousand and are now quoted at $38 for the first quality grade at the principal points of origin. The intermediate grade is also lower. Magnesite and chrome brick are unchanged. Demand is very light, as users are confining their needs to the most pressing repair work.

Old Material

Purchase by a consumer of at least 8000 tons of No. 1 heavy melting steel at $10.50 has brought the price range back to the level which prevailed during the greater part of December. This sale has also served to take much of the surplus scrap out of the market and to develop a generally stronger tone on all commodities. An exception might be made in the case of hydraulic compressed sheets, which are more freely available at $10. Outlets for blast furnace scrap and specialties are still rather limited, but production is not heavy. The larger scrap consuming plants in the district are gradually opening up, even though shipments are still limited at some points. The heavy melting steel on the recent Pennsylvania list is reported to have brought more than $10.50 on a direct sale to a consumer.

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Southern Pig Iron Reduced $1 at St. Louis; Some Grades of Scrap in Further Decline

ST. LOUIS, Jan. 12.—The first break in the price of pig iron in some time came during the week with the announcement that a Southern producer had made a price of $10 a ton, f.o.b. Birmingham, a drop of $1. The price of Northern iron is unchanged. The week was quiet.

Finished Steel

First quarter price of the Granite City Steel Co. on plates of 1.97½c. a lb., delivered St. Louis on the new freight rate, corresponds with the 1.70c. price at Chicago.

Warehouse concerns here have adopted cutting and burning extras on warehouse materials, which went into effect generally throughout the country on Jan. 4, resulting in a sharp advance in some prices, a slight reduction in others and little change on still others. The change does not affect rails. Base quotations are unchanged.

Old Material

The leading consumer of busheling and borings in the St. Louis district is now accepting shipments for January. All contracts with dealers for shipment of heavy melting steel to mills in the district have expired, and dealers are said to be without orders. Dealers are buying material only for storage. Nos. 1 and 2 heavy melting steel, No. 1 busheling, rails for rolling, and steel angle bars are 25c. a ton lower, and steel car axles are off 50c.

Railroad lists are as follows: Louisville & Nashville, 9600 tons; Southern, 8000 tons; Southern Pacific, 6120 tons; Great Northern, 2592 tons; New Yorks, Chicago & St. Louis, 2592 tons; Gulf Coast Lines, 1430 tons; Wabash, 1000 tons; Rock Island, 800 tons; Pullman Co., 392 tons; Ann Arbor, 230 tons; Kansas City Southern, 160 tons.

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Southern Pig Iron Reduced $1 at Cincinnati; Demand for All Products Is Still Sluggish

CINCINNATI, Jan. 12.—Quotations on Southern iron for shipment into this district were reduced $1 the past week, making the new price $10, base, Birmingham. Despite the reduction in price, demand for Southern continued to be sluggish. Northern iron, on the other hand, remains firm in Cincinnati, although competition elsewhere in the district has brought price shading. Foundries are operating at low rate and little change in the melt is seen. Consumers' interest in pig iron is confined to purchases for immediate needs. New business the past week totaled about 1000 tons, of which only 200 tons was Southern iron.

Coke

The price of by-product foundry coke was increased this month to $9.06, delivered in Cincinnati, reflecting increased freight rates.

Old Material

Occasional small orders are reported, but these fail to test prices. Leading users are restricting releases.

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Detroit Scrap Stronger; Some Grades Up 25c.

DETROIT, Jan. 12.—Purchases by consumers in the Youngstown district have strengthened prices of borings and short turnings, No. 1 busheling and hydraulic bundles, which are 25c. a ton higher. Other quotations are unchanged. The local market is relatively quiet, with transactions meager.

Chicago Mills Are Receiving More Inquiries for Steel

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CHICAGO, Jan. 12.—Inquiry for steel is heavier in the Western market, but ingot production is unchanged around 20 per cent of capacity.

Railroad and automotive buying has improved slightly. The Erie is reported about to close on 35,000 to 40,000 tons of rails, and the Northern Pacific bought 150 hopper cars from the Pressed Steel Car Co. to be built at Hegewisch, Ill.

Structural inquiry is heavier. Two Outer Drive bridges in Chicago are being delayed because of lack of funds. New bids are being asked by the Illinois State Highway Department on 4000 tons for the Mannheim Road bridge at Justice Park, Ill.

Plate orders for oil storage tanks for delivery in the Southwest placed in the last fortnight require close to 10,000 tons.

Buying of pig iron and wire products has improved.

Pig Iron

January merchant iron shipments are running 16 to 17 per cent ahead of those of the same period in December. Numerous plants which were down for inventories are starting up and ordering small tonnages. Auto and railroad work is a little heavier. No. 2 foundry iron is quoted at $16.50, Chicago. Two merchant furnaces are in blast in the district.

Plates

Oil storage tanks took more than 6000 tons of steel, in addition to 3000 tons placed in the preceding week. This is the heaviest buying of plates for tank work in some months and is for delivery in the Southwest. Minneapolis will take bids Jan. 20 on 2500 tons to 2700 tons of steel pipe.

Structural Steel

Bids have been asked for the third time on 4000 tons of steel for the Mannheim Road bridge at Justice Park, Ill., by the Illinois State Highway Department. Bids on the Outer Drive bascule bridge in Chicago, involving 2200 tons, have been returned unopened to the general contractors by the Lincoln Park Commission because of lack of funds. All of the substructure work has been completed, and the superstructure was about to be started. More inquiries for private work are reported, and fabricating shops expect to increase schedules

Though ingot production remains at 20 per cent, Chicago mills are receiving more steel inquiries.

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Prices for bars, plates and shapes more firmly established at 1.70c.

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Sheet mill operations have been stepped up.

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Scrap weak, though buying in some grades is heavier.

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soon despite the fact that many of the recent lettings involving taxpayers' money have been held up temporarily. Shapes are now quoted at 1.70c. a lb., Chicago.

Bars

Demand for bars is somewhat heavier, with much of the tonnage coming from the automotive industry. Producers report brighter prospects for road building, virtually all of the Western States having made plans to relieve unemployment by highway work during 1932. Farm implement manufacturers are slightly more active, although the future is considerably in doubt. Railroad shops are adding men and may be more active buyers later in the month. Specifications on contracts received by one large maker of bars in this territory were up sharply in the last week owing principally to automotive tonnage. The 1.70c. a lb. quotation for first quarter is reported to be holding.

Rails and Track Supplies

Railroads will be more active buyers of rails and track supplies as soon as the wage question has been settled, executives of Western mills believe. A small carrier has ordered a few thousand tons from Western mills. Rails placed by the Santa Fe and Chesapeake & Ohio with local mills late in 1931, have nearly all been rolled, and the two mills here are virtually idle. With the wage controversy approaching definite settlement, the outlook for rail buying is somewhat more promising.

Strip Steel

Some improvement has been noted in the automotive demand for strips. Schedules of Western strip mills are about the same as in December, averaging around 25 per cent of capacity. The automobile releases cover a period of 30 to 45 days. Prices are rather weak.

Warehouse Business

Demand for warehouse material increased sharply in the first 10 days of the new year despite inventory taking in various consuming lines. This was regarded as encouraging, as the heaviest buying usually develops around the middle or toward the end of the month. The number of orders taken was far ahead of those of December and nearly equal to the totals in the best weeks in November.

Wire Products

January shipments of wire products are expected to show a moderate gain as compared with those of December. Producers report larger orders, particularly from agricultural sections. Production schedules are slightly higher, averaging 25 to 30 per cent, compared with 20 per cent early in the month. Prices are steady.

Reinforcing Bars

New inquiries and awards are for very small tonnages. Dealers are holding to new price schedules that lack real tests because of a dull market. The 5000 tons for locks and a dam on the Mississippi River is still open.

Sheets

Sheet mill operations have been stepped up in the West, with the average 25 to 30 per cent. Buying has improved slightly, owing to the placing of small orders by most of the consuming lines.

Old Material

Iron and steel scrap prices are weaker, but buying of some grades is heavier and sentiment has improved. Sale of approximately 2500 tons of charging box size machinery cast is reported to an independent mill at $7.25 a gross ton, delivered. Cast grades and short rails have also been sold. The leading interest in the West is still expected to buy melting steel, but it is believed the price will be under the current nominal level of $8 a ton. Railroad lists were offered this week by the Rock Island, Louisville & Nashville and Southern.

Pacific Coast Steel Inquiries Are Largest in Month

Important Construction Projects Also in Contemplation—Ocean Rates on Steel Products to Be Advanced

SAN FRANCISCO, Jan. 11.—Although mills and mill agents report that the new year is slow in getting under way, jobbers find that so far the month is well ahead of November and December and that their industrial customers are entirely out of stocks.

Awards of major projects total only 550 tons of bars and 900 tons of cast iron pipe, yet new inquiries are the largest in many months, totaling 11,000 tons. In addition to 20,000 tons for the proposed Los Angeles Post Office and Union Terminal, the newly announced pending tonnage involves 940 tons of reinforcing bars, 4530 tons of shapes, 1850 tons of plates, 2610 tons of cast iron pipe, 414 tons of wrought steel pipe for Los Angeles, and 640 tons of rails for a belt line at Stockton's new harbor.

Intercoastal steamship companies have postponed a contemplated increase in freight rates on iron and steel commodities except pipe until after the end of February. It is understood that an increase of from $2 to $3 a ton may be expected, which presumably would raise Pacific Coast prices on all steel commodities.

Three California municipalities have announced bond issues for approximately $3,000,000 in public works, each involving large tonnages of steel for probable specification later in the year. Long Beach votes Jan. 27 on a proposed expenditure of $2,500,000 for water system additions, a sewage plant, storm drains, a municipal stadium, streets, park improvements and water front seawall and boat landings. Lynwood will vote in April on $125,000 for water system improvements involving 1400 tons of cast iron pipe. North Sacramento will also vote in April on $100,000 for a water system, including mains. The Superior Court has validated a $400,000 bond issue of Torrance for water system improvements.

Seattle will vote on a $1,800,000 bond issue on March 8 to finance the construction of the proposed new Ballard bridge. In Los Angeles two major new building projects are announced. Federal appropriation is expected for a $7,000,000 post office that will require 10,000 tons of structural steel, and the California Railroad Commission has stipulated that the proposed Union Terminal be carried through by the railroads. This job requires 8000 to 10,000 tons.

The California Highway Commission announces that plans for the $75,000,000 trans-bay bridge will be completed during the current year, and that four years will be required for construction. It will be financed by bonds, already authorized.

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Birmingham Steel Operations at the Highest Rate Since August; Pig Iron Still Dull

BIRMINGHAM, Jan. 12.—The pig iron market is still feeling the effects of the holiday interruption. Foundries have been slow in resuming operations. Some are working intermittently and others are not yet back to even December schedules. Demand continues uncertain and irregular. Current orders are mostly for carload lots. Quotations on district tonnage remain on a $12 base. Production of merchant iron is very restricted. Sloss-Sheffield Steel & Iron Co. and the Republic Steel Corpn. each have one furnace on foundry iron, but these at times are on slow schedules. The Tennessee company now has four blast furnaces active, two having resumed in connection with the reopening of the rail mill on Jan. 4. The plant of the American Cast Iron Pipe Co., which closed Christmas Eve, is starting up again this week. New pipe tonnage is scattered and small.

Finished Steel

Steel bookings have been at a fair rate since the first of the year, the weekly average being about the same as for late November and early December. Sheet demand and contracts for the first quarter have been rather steady. Shipments of wire products on fourth quarter contracts, permitted until Jan. 15, have been at a good rate. Open-hearth operations are at the highest rate since August. Last week the Tennessee company operated four at Fairfield and five at Ensley. Gulf States Steel is operating two at Alabama City.

Old Material

Steel mills are buying a limited amount, but foundries are virtually out of the market. Shipments on their contracts have been further restricted. Reductions of $1 a ton have been made on heavy melting steel and scrap steel rails.

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Canadian Railway Buying Has Not Materialized

TORONTO, Jan. 12.—Business in the Canadian pig iron markets is getting back to a trend somewhat similar to that before the year-end holiday season. Sales for the week totaled around 300 tons. No forward buying is being done. Consuming plants are operating around 25 per cent.

Despite the fact that many interests looked for business from the railways at the year-end, contracts have failed to appear, and unless some early change occurs further curtailment in operations will become necessary.

The Dominion Steel & Coal Co., Sydney, N. S., is starting operations again at its Wabana, Newfoundland, iron mines. Ore will be shipped to Europe, the United States and to the company's works at Sydney.

Pig iron production in Canada is from two blast furnaces and imports are negligible. Prices are unchanged.

Old Material

Toronto and Montreal dealers report business at the stagnation point. Prices are unchanged.

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Pipe Lines

Great Western Pipe Line Co., Mount Pleasant, Mich., recently organized, capital $100,000, plans immediate construction of pipe line in eastern part of Mount Pleasant oilfields. Cost over $75,000.

Madera Irrigation District, Madera, Cal., plans gravity water supply line in different parts of district. Cost about $4,000,000.

Limestone Oil & Gas Co., Springfield, Mo., plans 8-in. natural gas pipe line from Wilburton to Quinton, Okla., about 20 miles. Cost over $80,000. Company has recently increased capital from $50,000 to $500,000.

Atlantic Seaboard Corpn. is being organized as joint interest of Columbia Gas & Electric Co., 61 Broadway, and Standard Oil Co. of New Jersey, 26 Broadway, both New York, to take over and operate natural gas pipe lines from West Virginia and Kentucky fields through Virginia, Maryland and portion of Pennsylvania. It is planned to continue line construction to other points in eastern district, including New England.

Skelly Oil Co., Skelly Building, Tulsa, Okla., has let contract to Truman-Smith Construction Co., Tulsa, for 8-in. pipe line in Eldorado, Kan., oilfield district, about 30 miles.

Cleveland Mill Operations and Business in Slight Upturn

Orders Chiefly from Automobile Industry and Are for Bars, Sheets and Hot Strip—Prices Weak

CLEVELAND, Jan. 12.—A distinct, although rather moderate upturn, in the demand for finished steel is in evidence. The increased activity is confined largely to steel bars, sheets and hot strip, orders for which were more numerous the past week. The business came for the most part from manufacturers of automotive parts, who have just received some fairly good releases. Many of the motor car manufacturers, now that they have brought out new models, evidently are planning production programs for the next few weeks at an increase over their recent schedules. While the Ford Motor Co. has issued small releases against recent orders, this company has not yet sent out its round-lot inquiries. Industries outside of the motor car field have not shown signs of a revival since the start of the year.

Steel plant operations in Cleveland increased three points to 35 per cent this week with the starting up of one open-hearth furnace by a mill producing flat rolled material, mostly for the motor car trade. This is the first change in operations since the first week in December. Operations of finishing mills are also somewhat better.

Activity in the construction field is limited entirely to Ohio highway bridge work. No new inquiries have come out in the railroad field. The tone of the market is weak on flat rolled material, particularly on hot-rolled annealed sheets, on which 2.15c., Pittsburgh, has appeared, a decline of $2 a ton, and on hot-rolled strip, which is freely offered at 1.40c. for wide for good lots and at 1.50c. for narrow. While even low prices are reported, it is claimed that further concessions are for large lots of one size and are not fairly representative of the market. Another $3 a ton reduction has been made on vitreous enameling sheets. Steel bars are uniformly quoted at 1.50c., Cleveland, for both local delivery and outside shipment. Plates and shapes range from 1.50c. to 1.60c., Pittsburgh.

Pig Iron

A slightly more optimistic feeling has developed since the start of the year. Shipping orders from the motor car industry have improved over those of December and inquiry is a little better. New business is confined to small lots. Operations of jobbing foundries in this territory are still slack, many plants not running over one to two days a week. Prices are untested at $15 to $15.50, local furnace, for foundry and malleable iron for outside shipments and $16 for local delivery.

Iron Ore

Ore stocks at Lake Erie docks Jan. 1 amounted to 5,874,235 tons, compared with 6,330,509 tons on the same date a year ago. Shipments during December were 174,885 tons, against 137,299 tons during the previous year. Receipts at these docks for the year were 14,756,430 tons, against 31,779,844 tons in 1930. Shipments from Lake Erie docks last year were 11,188,153 tons, compared with 23,273,204 tons in 1930.

Semi-Finished Steel

Another reduction of $1 a ton to $27, Cleveland and Youngstown, for sheet bars, billets and slabs has been made by a local mill. This price is to apply to first quarter contracts, although no interest is shown in contracts. Orders were somewhat more plentiful the past week following the holiday lull.

Sheets

The market showed a little more activity the past week than during the previous few weeks. While no large sales to the automotive industry were reported, quite a few small-lot orders came from various consuming industries, enameling sheets showing more improvement than other grades. New weakness has developed in hot-rolled annealed sheets. Some business has been taken at 2.15c., Pittsburgh, and there are reports of even lower prices. Vitreous enameling sheets have again been reduced $3 a ton to 3.10c. for No. 20 gage, making a $6 a ton reduction within a few weeks. While some irregularities are reported on other grades, prices generally remain at recent levels.

Strip Steel

A fair volume of small-lot business in hot-rolled strip came from auto parts manufacturers during the week. Prices range from 1.40c. to 1.45c., Pittsburgh, for wide and from 1.50c. to 1.55c. for narrow material. Cold-rolled strip is quiet and unchanged at 1.90c. to 2.05c., Cleveland.

Bolts, Nuts and Rivets

Some good bolt and nut orders were placed by the motor car manufacturers the past week, which give assurance that the volume of business in January will show a gain over that of recent months. Demand from other consumers and jobbers was very slow. There is still evidence of price shading, in some cases 10 per cent being allowed in addition to the regular 73, 10 and 10 per cent discount. Rivet orders continue light.

Bars, Plates and Shapes

Merchant bars are moving better than recently, but plates and shapes are quiet, although some fair releases have come from a Lake shipyard against orders recently placed for construction changes in three Lake boats. The Ohio Highway Department received bids Jan. 8 for over 60 small bridges requiring 990 tons of structural steel and 400 tons of reinforcing bars and will take bids Jan. 22 on 30 additional bridges, nine of which will require 250 tons of structural shapes.

Old Material

Dealers are buying odd lots of heavy melting steel, compressed scrap and machine shop turnings for shipment to the Valley district. With the advance in freight rates, attempts are being made to get higher prices for scrap, but apparently without success, although present prices are not bringing out much material. A local mill that has taken no scrap for several weeks is not expected to accept shipments until Feb. 15. Prices are unchanged.

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New England Sales of Pig Iron and Bars Gain

BOSTON, Jan. 12.—Pig iron sales the past week totaled 3000 tons, the largest for any similar period in several months. They included 2000 tons of Dutch iron to a Massachusetts textile machinery manufacturer at about $17 a ton, delivered, 300 tons of Indian, and miscellaneous lots of domestic iron. For the first time in many weeks there are several inquiries in the market, most of them small. Domestic furnaces are not trying to meet prices quoted on Dutch iron.

Reinforcing Steel

Sales the past week were approximately 2300 tons, the largest in many weeks, and included 1500 tons of billet bars for a local publishing plant, 600 tons of rail steel bars for State bridges, and 125 tons of rail steel bars for State road work. The remainder consisted of small tonnages of billet bars. From stock, billet bars in 1 to 5-ton lots are 2.75c. a lb., base; and in larger quantities, 2.15c. Rail steel bars are 2c. to 2.15c. a lb., delivered Boston rate points.

Old Material

Current activity is largely confined to scattered carlots of No. 1 heavy melting steel at $6.50 a ton and bundled skeleton at $5 a ton, delivered Worcester, Mass., and No. 2 steel for Weirton consumption, for which brokers are paying $3.25 to $3.50 a ton, on cars shipping point.

Eastern Pennsylvania Ingot Output Slightly Higher

Improved Buying Not Expected Until End of Month; 800-Ton Automobile Sheet Order Placed With Eastern Mill

PHILADELPHIA, Jan. 12.—Small orders have been placed in the past week, chiefly for sheets and bars, but mills do not expect much improvement in buying before the end of the month, when it is suggested that some replacement business may develop. Prospects of better business in the immediate future are believed to be based on public acceptance of the new automobile models, justifying at least moderately increased activity in that industry. Important buying by the railroads is not expected until the present effort for a 10 per cent wage reduction has succeeded.

Fabricating shops in this district are poorly engaged, and are bidding on little new business of importance. Two sizable projects, each calling for upward of 5000 tons of structural steel, are in prospect for late spring—the Philadelphia Post Office and the United States Custom House.

Steel ingot production is slightly higher this week at 16 to 17 per cent of capacity.

Pig Iron

Foundry iron buying is still of carload lots for prompt shipment, and, with the larger users covered for at least part of this quarter, not much increase is expected. While Birmingham foundry iron has been reduced $1 a ton to $10, base, Birmingham, or $15.25 a ton, on cars at Philadelphia docks, the new level is more competitive in other districts than in eastern Pennsylvania. On a substantial tonnage for Delaware River pipe shops, however, barge delivery could be arranged at about $14.90 a ton, delivered buyer's dock. Eastern Pennsylvania prices are generally unchanged at the recent levels.

Sheets

Only minor orders have been placed by consumers in this district, except for one contract, about 800 tons of light plates and wide blue annealed sheets for truck bodies, awarded by a Trenton company to an eastern Pennsylvania sheet mill. Sheet prices are not strong, but current orders are as a rule too small to offer an actual test of market conditions.

Plates, Shapes and Bars

Ship and barge repair work promises a small tonnage of plate business, including some plates for repairs to four Government scows to be reconditioned by the Sun Shipbuilding & Dry Dock Co., Chester. Plate prices range from 1.60c. to 1.65c., Coatesville, Pa., or 1.6935c. to 1.7435c., delivered Philadelphia. Steel bar orders, although still small in size, have increased in number since Jan. 1. Billet steel reinforcing bars are subject to occasional concessions from 1.50c., Pittsburgh, or 1.81c., Philadelphia. The only sizable reinforced concrete project is a pumping station in Easton, Pa., requiring about 100 tons of bars. Among structural steel projects is a new Germantown station for the Reading Co.

Imports

In the week ended Jan. 9, 986 tons of chrome ore arrived at this port from British India.

Old Material

Transactions are limited to occasional carload lots of special grades of scrap. Consumers of Nos. 1 and 2 heavy melting steel and cast scrap in this district have not resumed acceptance of deliveries on contracts since the holiday lull.

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Valley Mills See No Significant Improvement; Important Automobile Tonnage Still Lacking

YOUNGSTOWN, Jan. 12.—Steel specifications thus far in the month show a gain over the corresponding December period. However, the increase in tonnage is by no means as large as seasonal precedent would call for, and it is disappointing to most mills. As was the case in December, orders for sheets and strip steel predominate, although shipments of wire products have shown some improvement. Movement of bars and plates is very light, and pipe is seasonably quiet.

Although much was said at the end of the year about the low inventories of steel consumers, purchases to replenish stocks have been very meager. In fact, practically all of the tonnage now moving out of Valley mills is going directly into manufacturing consumption. No one group of consumers predominates. The absence of significant releases from the automobile industry is depressing. Most of the large automobile makers have completed stocks for show purposes, although the Ford Motor Co. is still silent regarding the requirements for its new model. While buying for this purpose is expected to begin before the end of the month, there is no assurance that quantity production will be achieved before the middle of March.

Steel ingot production in the Valleys has held the same level for two weeks, with no important change yet in prospect. Fourteen of the 53 independent open-hearth units in the district are active, and the leading interest is operating its two active plants at about 25 per cent. Only three blast furnaces are running, although several are banked, and at least one steel works' unit will likely begin pouring iron again this week. Stocks of pig iron in the Valleys are very light, and steel ingot accumulations were reduced to a minimum to avoid the year-end inventory tax. Finishing mill operations average slightly less than raw steel production, as one company has already begun to accumulate steel to replace its depleted inventory. Pig iron and steel ingot capacity of the Warren, Ohio, plant is still inactive, although tin and strip mills are running at that point.

Purchase of a considerable tonnage of No. 1 heavy melting steel by a large Valley consumer at $10 has established the scrap market on a higher and firmer level. Pig iron prices are unchanged and generally untested.

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Buffalo Pig Iron Trade Has a Slight Pick-up

BUFFALO, Jan. 12.—There has been a little spurt in pig iron shipments owing to depleted inventories. Several tonnages are hanging fire. Storage iron is moving out steadily.

Finished Steel

The Lackawanna plant of Bethlehem Steel is operating five open-hearth furnaces, but the number may be reduced. Republic Steel is operating three open-hearths this week.

Old Material

The leading consumer has suspended all shipments and is out of the market indefinitely. As the second and third largest consumers are also out of the market and have suspended shipments, there is a minimum of activity.

Large Tin Plate Contracts to Be Placed in New York This Week

American and Continental Companies Have Delayed Business Beyond Usual Time—Sheet Prices Weak

NEW YORK, Jan. 12.—The outstanding business in prospect for this week is the distribution of contracts for tin plate by the American Can Co. and the Continental Can Co., amounting to several hundred thousand tons. These contracts are usually placed in November or December, but the can companies are said to have been making a close ascertainment of probable needs for this year in order to schedule their manufacturing operations evenly. The credit situation affecting many canning plants has been a new factor to reckon with this year. Some releases for January shipment were, of course, given late last year, but the formal contracts for 1932 were delayed, and the absence of this tonnage on December books is presumed to be in part responsible for the large decline in the unfilled orders of the United States Steel Corpn. last month. Contracts between the can companies and the tin plate makers are said also to have been held back because of price negotiations.

No other branch of steel buying has improved either in respect to actual orders or future prospects. New York sales offices have been booking approximately the same volume of business this month as during the early part of December.

Prices of the flat-rolled products are still subject to concessions. The situation is so much disturbed that steel companies scarcely know what to quote on any piece of business. Barrel makers have been given prices of 2.15c. on No. 24 hot-rolled annealed sheets, a decline of $2 a ton, and are said to have taken barrel contracts on this basis. Hot-rolled strip is now generally available at 1.40c., Pittsburgh, for wide and 1.50c. for narrow.

Pig Iron

Although total volume of new business continues to be limited, sales of small lots are more frequent. A resumption of operations, following the holiday recession, is reported by a number of foundries, and shipping releases are consequently more liberal. Total sales for the week, at 2000 tons, compare with a like amount the preceding week and 2500 tons two weeks ago. Inquiries are scarce, with the largest pending lot for 250 tons for first quarter delivery.

The price of Southern iron for Northern delivery has been reduced $1, to $10 a ton, Birmingham.

The Witherbee, Sherman & Co.'s No. 2 furnace at Port Henry, N. Y., has been banked for two months. Stocks at that furnace are sufficient to take care of demand until opening of navigation, when operations are expected to be resumed.

The Ford Motor Co. is inquiring for 250 tons of ferromanganese for January-February shipment.

Reinforcing Bars

Prices on bars are firmly held at 1.50c., Pittsburgh, or 1.85c., delivered New York. The Federal archives building at Washington, on which specifications are being issued this week, is expected to require about 1500 tons of bars. A bridge over the Grand Central Parkway in Queens will take about 200 tons. Awards of 385 tons for two piers at West Tenth Street and West 107th Street and 500 tons for a pier at West Forty-ninth Street were made to Joseph T. Ryerson & Son, Inc., and Empire Steel Products Co., Inc., respectively.

Old Material

Shipments of scrap to eastern Pennsylvania are at a standstill. Barge storage of Nos. 1 and 2 heavy melting steel continues in New York Harbor for spring shipment to Buffalo, and the offering price is unchanged at $5.50, on barge. Meanwhile, recent strength in the Pittsburgh district has brought offers from dealers there of $10 to $10.25 a ton delivered, or $4.57 to $4.82 a ton, New York, for No. 1 steel, which is a better price to dealers in this district than offers of $7.50 to $7.75 a ton, delivered eastern Pennsylvania. Other grades of scrap continue quiet and prices lack firmness.

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Reconstruction Corporation Will Function Soon

WASHINGTON, Jan. 12.—Determined to make the Reconstruction Finance Corporation a going concern to aid recovery of business, President Hoover is certain to move quickly to have the organization set up. The bill provides for a capital stock of $500,000,000, to be subscribed by the Treasury, and loans can be made up to $1,500,000,000.

Management of the corporation will be in charge of a board of directors, consisting of the Secretary of the Treasury, the Secretary of Agriculture, and the Governor of the Federal Reserve, members ex-officio, and four others, two each to be selected by the President and the Speaker of the House of Representatives. The nominations will have to be confirmed by the Senate.

Various prominent men in business, economics and finance have been mentioned as possible selections. They include Owen D. Young, New York, chairman, General Electric Co.; Bernard M. Baruch, New York, former head of the War Industries Board; Henry N. Robinson, Los Angeles, and others.

Application of the machinery of the corporation, it is stated, will be applied at the earliest possible date. Loans are expected to be made by Feb. 1, if not earlier. The measure provides for issuance of debentures and other obligations, in making loans to distressed banks, railroads and agricultural associations. Bonds will be tax exempt, except as to surtaxes, and estate, inheritance and gift taxes.

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Steelweld Machinery Co. Sold to Cleveland Crane

The Cleveland Crane & Engineering Co., Cleveland, has acquired a substantial interest in the Steelweld Machinery Co., Cleveland, manufacturer of rolled steel frame bulldozers, bending brakes and special tools.

Cyril Bath remains president of the Steelweld Machinery Co. in charge of sales; William F. Wehr, vice-president; A. C. Garnett, secretary, and E. F. Pavlin, treasurer.

The Steelweld Machinery Co. has considerably supplemented its line of tools and, with additional facilities, will be able to make various forms of hot and cold metal bending, forming, twisting and shearing machinery up to the largest sizes.

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Unfilled Steel Orders at 30-Year Low

Unfilled orders of the United States Steel Corpn., as of Dec. 31, were 2,735,353 tons, a decline of 198,538 tons in the month. The latest figure is the lowest price since Dec. 31, 1910, when the total was 2,674,757 tons.

The December decline is the ninth in succession, the total loss during that period having been 1,259,977 tons. In every previous December since 1922 the unfilled orders of the Steel Corporation had shown a gain.

Unfilled orders at the end of each month since 1928 follow:

	1931 Tons	1930 Tons	1929 Tons
January	4,132,351	4,468,710	4,109,487
February	3,965,194	4,479,748	4,144,341
March	3,995,330	4,570,653	4,410,718
April	3,897,729	4,354,220	4,427,763
May	3,620,452	4,059,227	4,304,167
June	3,479,323	3,968,064	4,256,910
July	3,406,816	4,022,055	4,088,177
August	3,169,457	3,580,204	3,658,211
September	3,144,833	3,424,338	3,902,581
October	3,119,432	3,481,763	4,086,562
November	2,933,891	3,639,636	4,125,345
December	2,735,353	3,943,596	4,417,193

Fabricated Structural Steel

Projects of 11,500 Tons Include Pier in New York and Bridges in West—Awards Only 9500 Tons

FABRICATED structural steel projects of about 11,500 tons include 2000 tons for a Clyde-Mallory Line pier in New York, 1500 tons for a post office at Phoenix, Ariz., 1200 tons for a bridge in Seattle, and 1240 tons for highway bridges in Ohio.

Awards of 9500 tons include 1200 tons for a high school in Mount Vernon, N. Y., 2400 tons for high tension towers at Safe Harbor, Pa., and Perryville, Md., and 1180 tons for the Union Club in New York. Awards follow:

NORTH ATLANTIC STATES

Providence, R. I., 300 tons, theater to Providence Steel & Iron Co.

Mount Vernon, N. Y., 1200 tons, Washington Junior High School, to McClintic-Marshall Corpn.

New York, 1180 tons, Union Club, to George A. Just Co.

Newark, N. J., 200 tons, express building for Pennsylvania Railroad, to American Bridge Co.

Philadelphia, 2400 tons, towers for high tension lines for Pennsylvania Water & Power Co., between Safe Harbor, Pa., and Perryvale, Md., to Blaw-Knox Co.

Philadelphia, 150 tons, building on Woodland Avenue for Bell Telephone Co., to Robinson Iron & Steel Co.

THE SOUTH AND SOUTHWEST

Nassau, Fla., 300 tons, highway bridge, to Ingalls Iron Works Co.

State of West Virginia, 400 tons, highway bridge, to American Bridge Co.

State of Oklahoma, 600 tons, highway bridge, to J. B. Klein Iron & Foundry Co., Oklahoma City.

State of Florida, 180 tons, highway bridge between Liberty and Leon Counties, to Austin Brothers Bridge Co.

CENTRAL STATES

Monroe, Mich., 115 tons, highway bridge, to R. C. Mahon Co.

State of Ohio, 275 tons, divided among Mount Vernon Bridge Co., McClintic-Marshall Corpn., Fort Pitt Bridge Works Co., and an unnamed fabricator.

Mount Vernon, Ill., 200 tons, highway bridge, to Vincennes Bridge Co., Vincennes, Ind.

State of Illinois, 885 tons, highway bridges, to International Steel & Iron Co.

Cape Girardeau, Mo., 400 tons, to Stupp Brothers Bridge & Iron Co.

State of Missouri, 500 tons, bridge work, to J. B. Klein Iron & Foundry Co. and Muskogee Iron Works.

Dearborn, Mich., 120 tons, new balcony for blast plant for Ford Motor Co., to R. C. Mahon Co., Detroit.

Butler, Wis., 450 tons, two plate girder spans, to American Bridge Co.

Tiltonville, Ohio, 100 tons, high school, to Burger Iron Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

New York, 200 tons, Mott Haven Health Center; bids to be taken next week.

Brooklyn, 200 tons, apartment house in Bay Ridge.

Bergen County, N. J., 330 tons, two State highway bridges over New York, Susquehanna & Western Railroad.

New York, 2000 tons, pier No. 34 on North River for Clyde-Mallory Line.

New York, 200 tons, highway bridge in Borough of Queens.

Lakehurst, N. J., 250 tons, storage building for Bureau of Yards & Docks.

Kearny, N. J., 650 tons, generator station for Public Service Corpn. of New Jersey.

Pennsylvania Railroad, 400 tons; 200 tons for bridge at Stelton, N. J., 200 tons for a tunnel at Baltimore.

Wilmington, Del., 250 tons, office building for Delaware Power & Light Co.

Baltimore & Ohio Railroad, 200 tons, grade crossing elimination in Baltimore.

Philadelphia, 200 tons, passenger and freight station in Germantown for Reading Co.

THE SOUTHWEST

Henryetta, Okla., 300 tons, building for Eagle-Picher Lead Co.

CENTRAL STATES

State of Ohio, 1240 tons, several highway bridges; bids for 990 tons taken Jan. 8, bids for 250 tons to be taken Jan. 22.

Savanna, Ill., 1200 tons, highway bridge over Mississippi River.

State of Missouri, 500 tons, additional bridge work.

WESTERN STATES

Vancouver, Wash., 200 tons, three buildings for Federal Bureau of Public Roads.

Los Angeles, 670 tons, County Road Department requirements.

Phoenix, Ariz., 1500 tons, post office.

Seattle, 1200 tons, University Avenue bridge; bids Jan. 29.

Beverly Hills, Cal., 150 tons, post office.

FABRICATED PLATE

AWARDS

Clayton, Mo., 200 tons, standpipe for St. Louis County Water Co., to Chicago Bridge & Iron Co.

Kansas City, Mo., 600 tons, 20 pontoons and dredge line pipe for United States Engineer's Office, to Chicago Bridge & Iron Co.

Wilmington, Cal., 100 tons, tank and tower for Hooker Electrochemical Co. plant, to Chicago Bridge & Iron Works.

NEW PROJECTS

Signal Hill, Cal., 753 tons, 18 and 20-in. pipe alternate; bids close Jan. 25.

Sunnyvale, Cal., 500 tons, helium tank for naval dirigible dock.

Washington, 1500 tons, two dredges for lower Mississippi River Government work; bids Feb. 5.

Chicago, 700 tons, repair work on lake freighters.

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Reinforcing Steel

Awards 5100 Tons — New Projects 3700 Tons

AWARDS

Poughkeepsie, N. Y., 400 tons, Hudson River State Hospital, to Kalman Steel Co.

New York, 385 tons, piers at West Tenth and West 107th Streets, Hudson River, to Joseph T. Ryerson & Son, Inc.; Allen N. Spooner & Son, Inc., general contractor.

New York, 500 tons, pier at West Forty-ninth Street, Hudson River, to Empire Steel Products Co., Inc.; Allen N. Spooner & Son, Inc., general contractor.

Boston, 1500 tons, Christian Science publishing plant, to Truscon Steel Co.

State of Massachusetts, 600 tons, bridges at Sharon, Walpole and Norwood, to Northern Steel Co.

Andover, Mass., 125 tons, State road to Northern Steel Co.

Washington, 500 tons, superstructure, United States Supreme Court building, to Concrete Steel Co.

Washington, 300 tons, addition to St. Elizabeth's Hospital, to Buffalo Steel Co.

Chillicothe, Ohio, 200 tons, Veterans' Hospital, to Pollak Steel Co.

Arcadia, Cal., 300 tons, grade separation over Santa Fe tracks, to Schmidt Steel Co.

Sacramento, 100 tons, additional tonnage for filtration plant, to Concrete Engineering Co.

San Diego, 150 tons, public museum in Balboa Park, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

New York, 200 tons, bridge over Grand Central Parkway, Queens.

Washington, 1500 tons, Government Archives Building; bids to be taken soon.

Easton, Pa., 100 tons, pumping station for city; general contract to Collins & Maxwell, Easton.

Cincinnati, 500 tons, mail handling building, for Cincinnati Union Terminals Co.

Joliet, Ill., 100 tons, three bridges for Illnois Waterway Commission.

State of Arizona, 113 tons, Wickenburg highway bridge.

Cloverdale, Cal., 210 tons, highway structures.

State of Oregon, 148 tons, State highway construction in Douglas, Malheur and Multnomah counties.

Fresno, Cal., 100 tons, library at State Teachers' College.

Oakland, Cal., 100 tons, piling for El Dorado Oil Co. plant.

Los Angeles, 134 tons, county stock requirements.

Los Angeles, 500 tons, inverted siphon for Boquet Canyon project.

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Railroad Equipment

Northern Pacific has placed an order for 150 hopper cars with Pressed Steel Car Co., which will fill the order at its Hegewisch, Ind., plant.

United States Navy is inquiring for 10 50-ton steel underframe flat cars.

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Cast Iron Pipe

Buffalo awarded 8000 tons of 36 and 60-in., and 357 tons of 36 and 60-in. fittings to United States Pipe & Foundry Co.

Boston awarded 2050 tons of 4 to 16-in. to United States Pipe & Foundry Co.

Jersey City, N. J., purchased 800 tons of 6 to 20-in. from Warren Foundry & Pipe Corpn.

Westchester County, N. Y., awarded 110 tons of 20-in. Class A for sewer project to United States Pipe & Foundry Co.

Kalispell, Mont., placed 550 tons of 6 to 20-in., Class 150, with National Cast Iron Pipe Co.

The Dalles, Ore., purchased 100 tons of 6-in., Class B, from Pacific States Cast Iron Pipe Co.

Borough of Queens, N. Y., will open bids this week on 700 tons of 8 and 12-in.

Borough of Manhattan is taking bids until Jan. 20 on 700 tons of 6 to 20-in.

Lancaster, Pa., is opening bids on Jan. 14 on 2000 tons of 48-in. for rapid screen filtration plant.

Washington will open bids on Jan. 20 on upward of 2500 tons of various sizes Class B cast iron pipe; alternate bids are being taken on concrete pipe.

Milwaukee closes bids Jan. 22 on 1200 tons of 12-in. and 500 tons of 16-in., Class C pipe; 115 tons of special castings and 30 tons offset pipes, Class D, 6 to 16-in. diameters.

Orange County, Cal., opened bids on 114 tons of 4-in. Class 150, on which Grinnell Co. is low bidder.

Alhambra, Cal., is inquiring for 140 tons of 6 and 8-in. cement lined pipe.

Burbank, Cal., is taking bids on 450 tons of 18-in., Classes 200 and 250.

Spokane, Wash., is in the market for 100 tons of 6-in., Class B.

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Tariff Bill Probably Will Be Vetoed

WASHINGTON, Jan. 12.—The Democratic tariff bill was passed by a vote of 214 to 182 in the House last Saturday. Although it is generally believed the measure will also pass the Senate, it will, of course, be vetoed by President Hoover should it reach him. His veto could not be overridden.

Copper Price Advanced and Sales Improve; Resales Govern Tin Price; Lead Active

NEW YORK, Jan. 12.—Although domestic buying is not in large volume, the price of electrolytic copper is strong, with sales at 7.37½c. a lb., delivered, yesterday, and 7.50c., delivered, today. A few transactions are for prompt shipment, but most buyers specify second quarter delivery. Sellers are in some cases seeking absolute assurance that the buyer will accept deliveries as specified, and are refraining from any sales into third quarter, part of an effort to curtail the forward selling which became so extended under recent market conditions.

Copper Exporters, Inc., has advanced its quotation ⅛c. a lb. to 7.62½c., delivered usual European ports. While export sales have not been large so far this month, totaling only 7500 tons up to Jan. 12, it is noteworthy that about half this tonnage was sold yesterday and today. All members of Copper Exporters have now subscribed to the recently revised working regulations of that organization. Lake copper is moderately active, and the price has been advanced to 7.50c., delivered, yesterday, and 7.62½c., delivered, today.

Tin

Pressure to sell by second hands has developed a moderate amount of activity in the New York market, and resale lots of tin have been moved at ⅜c. to 1c. lower than the cost of imported tin would be at today's London market. The market has been fairly steady since Jan. 7, when it advanced from 21c. to 21.70c. a lb., reflecting altered exchange value of the pound sterling. There is no apparent desire to sell tin for future delivery, so most of the current business is in small lots for prompt shipment. The London market today is £142 12s. 6d. a ton for spot standard, £145 15s. for future standard, £145 7s. 6d. for spot Straits and £147 15s. for shipments from the East. Shipments from Singapore, including Jan. 9, have been 1042 tons, which is slightly below estimates of 5500 tons for the month. Stocks of tin in United Kingdom warehouses have increased 76 tons in the past week to 31,388 tons.

Lead

Buying has shown a decided improvement yesterday and today, and sellers still estimate that 25 per cent of January requirements are still to be covered. Meanwhile, consumers are beginning to foresee February needs at the current prices, 3.75c. a lb., New York, and 3.55c. a lb., St. Louis.

Zinc

Prices still lack strength, with buying on a small scale as galvanizers continue to cover requirements sparingly. In the past week quotations have declined from 3.10c., East St. Louis, and 3.47c., New York, on Jan. 6, to 3.07½c., St. Louis, and 3.44½c., New York, on Jan. 7, and to 3.05c., St. Louis, and 3.42c., New York, on Jan. 9. As the price receded to a new low level, some buying was stimulated for January and into February. Sellers are quoting a 2½c. a lb. premium for the latter delivery, but, with prices lacking firmness, much current business is being done at the minimum price, even for forward shipment.

Antimony

Stocks of the Chinese metal continue to accumulate in the hands of importers, many shipments on consignment. As a result, the price continues its downward trend and is quotable today at 6c. a lb., duty paid, New York, for prompt shipment and about 5.87½c., duty paid, New York, for future.

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Hudson-Essex Establish Canadian Plant

Hudson-Essex of Canada, Ltd., has been formed to manufacture Hudson and Essex motor cars at a plant in Tilbury, Ont. A. E. Barit is president; Max F. Wollering and Chester G. Abbott, vice-presidents; and A. Hood, secretary and treasurer. The company has 600 sales outlets throughout Canada which will be supplied with cars from the new plant, whereas formerly cars for the Canadian market were shipped from the Hudson Motor Car Co.'s plant in Detroit.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 12	Jan. 11	Jan. 9	Jan. 8	Jan. 7	Jan. 6
Lake copper, New York	7.62½	7.50	7.37½	7.37½	7.37½	7.37½
Electrolytic copper, N. Y.*	7.25	7.12½	7.00	7.00	7.00	7.00
Straits tin, spot, N. Y.	22.00	21.75	....	21.75	21.70	21.00
Zinc, East St. Louis	3.05	3.05	3.05	3.07½	3.07½	3.10
Zinc, New York	3.42	3.42	3.42	3.44½	3.44½	3.47
Lead, St. Louis	3.55	3.55	3.55	3.55	3.55	3.55
Lead, New York	3.75	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.00c. a lb., New York.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	24.00c. to 25.00c.
Tin, bar	26.00c. to 28.00c.
Copper, Lake	8.75c. to 9.75c.
Copper, electrolytic	8.50c. to 9.50c.
Copper, casting	8.25c. to 9.25c.
*Copper sheets, hot-rolled	16.62½c.
*High brass sheets	13.37½c.
*Seamless brass tubes	16.62½c.
*Seamless copper tubes	16.12½c
*Brass rods	11.12½c.
*Brazed brass tubes	22.12½c.
Zinc, slab	4.75c. to 5.25c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.50c. to 5.00c.
Lead, bar	6.25c. to 7.25c.
Lead sheets	8.00c.
Antimony, Asiatic	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	17.00c. to 18.00c.
Solder, ½ and ½	15.25c. to 16.25c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	26.50c.
Tin, bar	28.50c.
Copper, Lake	8.37½c.
Copper, electrolytic	8.37½c
Copper, casting	8.00c.
Zinc, slab	4.75c. to 5.00c.
Lead, American pig	4.30c. to 4.50c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	29.50c.
Solder, ½ and ½	18.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers Selling Prices
Copper, hvy. crucible	5.75c.	6.50c.
Copper, hvy. and wire	5.50c.	6.25c.
Copper, light and bottoms	4.50c.	5.25c.
Brass, heavy	2.75c.	3.50c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.25c.	5.00c.
No. 1 yel. brass turnings	3.25c.	3.75c.
No. 1 red brass or compos. turnings	3.75c.	4.50c.
Lead, heavy	2.75c.	3.125c.
Zinc	1.25c.	1.75c.
Cast aluminum	3.25c.	5.00c.
Sheet aluminum	9.00c.	11.00c.

▲▲▲ Prices of Finished and Semi-Finished Steel,

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.81c. to 1.91c.
Del'd New York	1.85c. to 1.95c.
F.o.b. Cleveland	1.55c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.50c. to 1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.40c. to 1.50c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.50c. to 1.60c.
Del'd Philadelphia	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
Del'd Cleveland	1.7035c. to 1.8035c.
Del'd Philadelphia	1.6935c. to 1.7435c.
F.o.b. Coatesville	1.60c. to 1.70c.
F.o.b. Sparrows Point	1.60c. to 1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
Del'd New York	1.798c. to 1.898c.
C.i.f. Pacific ports	1.80c. to 1.85c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Bethlehem	1.60c. to 1.70c.
Del'd Cleveland	1.7035c. to 1.8035c.
Del'd Philadelphia	1.5995c. to 1.6495c.
Del'd New York	1.76775c. to 1.86775c.
C.i.f. Pacific ports (standard)	2.05c.
C.i.f. Pacific ports (wide flange)	2.15c.

Alloy Steel Bars

(F.o.b. maker's mill)

S.A.E. Series Numbers	Alloy Quantity Bar Base, 2.65c. per Lb. Alloy Differential per 100 Lb.
2000	(1¼% Nickel) $0.25
2100	(1½% Nickel) 0.55
2300	(3½% Nickel) 1.50
2500	(5% Nickel) 2.25
3100	Nickel Chromium 0.55
3200	Nickel Chromium 1.35
3300	Nickel Chromium 3.80
3400	Nickel Chromium 3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum) 0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum) 0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel) 1.05
5100	Chromium Steel (0.60 to 0.90 Chromium) 0.35
5100	Chromium Steel (0.80 to 1.10 Chromium) 0.45
5100	Chromium Spring Steel 0.20
6100	Chromium Vanadium Bar 1.20
6100	Chromium Vanadium Spring Steel 0.95
9250	Silicon Manganese Spring Steel (flats) 0.25
	Rounds and squares 0.50
	Chromium Nickel Vanadium 1.50
	Carbon Vanadium 0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.00c.
Bars, f.o.b. Chicago	2.00c.
Bars, Cleveland	2.00c.
Bars, Buffalo	2.00c.
Shafting, ground, f.o.b. mill	*2.35c. to 3.30c.

*According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.60c. to 1.70c.
No. 10, f.o.b. Chicago mills	1.75c. to 1.80c.
No. 10, del'd Philadelphia	1.96c. to 2.01c.
No. 10, f.o.b. Birmingham	1.85c.
No. 10, c.i.f. Pacific Coast ports	2.35c.

Hot-Rolled and Annealed

No. 10, Pittsburgh	1.75c. to 1.80c.
No. 10, Chicago mills	1.85c. to 1.90c.
No. 10, Birmingham	1.95c. to 2.00c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.15c. to 2.35c.
No. 24, f.o.b. Chicago mills	2.40c. to 2.50c.
No. 24, del'd Philadelphia	2.61c. to 2.71c.
No. 24, f.o.b. Birmingham	2.50c. to 2.55c.
No. 24, c.i.f. Pacific Coast ports	2.90c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.25c.
No. 10 gage, f.o.b. Chicago mills	2.35c.
No. 10 gage, del'd Philadelphia	2.56c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.85c.
No. 20 gage, f.o.b. Chicago mills	2.95c.
No. 20 gage, del'd Philadelphia	3.16c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	2.90c. to 3.00c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.65c.
No. 20, f.o.b. Pittsburgh	3.25c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.80c. to 2.90c.
No. 24, f.o.b. Chicago mills	2.90c. to 3.00c.
No. 24, del'd Philadelphia	3.09c. to 3.19c.
No. 24, f.o.b. Birmingham	2.95c. to 3.05c.
No. 24, c.i.f. Pacific Coast ports	3.40c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.90c. to 3.00c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 28, Chicago mills	2.60c. to 2.70c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. $9.50	25-lb. coating I.C. $14.10
15-lb. coating I.C. 12.00	30-lb. coating I.C. 14.90
20-lb. coating I.C. 13.00	40-lb. coating I.C. 16.70

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh	1.50c.
Wider than 6 in., P'gh	1.40c.
6 in. and narrower, Chicago	1.65c. to 1.70c.
Wider than 6 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.60c. to 1.70c.
Cooperage stock, Chicago	1.70c. to 1.80c.

Cold-Rolled Strips

F.o.b. P'gh	1.95c. to 2.05c.
F.o.b. Cleveland	1.90c. to 2.05c.
Del'd Chicago	2.25c. to 2.35c.
F.o.b. Worcester	2.15c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.90c. to 3.00c.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe ▲▲▲

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland) (After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.95
Smooth coated nails	1.95
Galvanized nails	3.90

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.

Woven wire fence, Nos. 9 and 11 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	$4.00
Light (from rail steel), f.o.b. mill	$2.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝-in. and larger	$2.60
Spikes, ½-in. and larger	2.60
Spikes, boat and barge	2.80
Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

BOLTS, NUTS RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73, 10 and 10
†Carriage bolts	73, 10 and 10
Lag bolts	73, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73, 10 and 10
Hot-pressed nuts, blank or tapped, square	73, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons	73, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73, 10 and 10
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	73, 10 and 10
Semi-finished hexagon castellated nuts, S.A.E.	73, 10 and 10
Stove bolts in packages, P'gh	80, 25 and 10
Stove bolts in packages, Ch'go	80, 25 and 10
Stove bolts in pkgs., Cleveland	80, 25 and 10
Stove bolts in bulk, P'gh	80, 25, 10 and 2½
Stove bolts in bulk, Ch'go	80, 25, 10 and 2½
Stove bolts in bulk, Cleveland	80, 25, 10 and 2½
Tire bolts	60, 10 and 10

Discounts of 73, 10 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85, 10 and 10
Upset hex. cap screws, S.A.E. thread	85, 10 and 10
Upset set screws	80, 10 and 5
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$28.00
Rerolling, 4-in. and under 10-in., Youngstown	28.00
Rerolling, 4-in. and under 10-in., Cleveland	28.00
Rerolling, 4-in. and under 10-in., Chicago	29.00
Forging quality, Pittsburgh	$34.00 to 35.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$28.00
Youngstown	27.00
Cleveland	27.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$28.00
Youngstown	28.00
Cleveland	28.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.25 to $2.35
Foundry, f.o.b. Connellsville prompt	3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	$9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines	$1.70 to $1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.40 to 0.60
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	3.50c.
No. 4 industrial	3.00c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	3.50c.
No. 4 industrial	3.25c.

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$13.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

FLUXES AND REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$30.00	$25.00 to $30.00
Maryland	38.00	25.00 to 30.00
New Jersey	$44.00 to 57.00	
Ohio	38.00	25.00 to 30.00
Kentucky	38.00	25.00 to 30.00
Missouri	35.00	25.00 to 30.00
Illinois	38.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$40.40 to $41.40
4-in., del'd Chicago	43.40 to 44.40
6-in. and larger, del'd New York	$30.20
4-in., del'd New York	33.20
6-in. and larger, Birmingham	$32.00 to 33.00
4-in., Birmingham	$35.00 to $36.00

Class "A" and gas pipe, $3 extra.

Pig Iron Prices for All Districts

The freight rate advance, effective Jan. 4, increased pig iron tariffs 13.44c. per gross ton; for convenience the delivered prices in the following tables are figured on the basis of 13c. additional.

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$15.00
Bessemer	$16.00 to 16.50
Gray forge	15.50 to 16.00
No. 2 foundry	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
Malleable	16.00 to 16.50
Low phos., copper free	26.89 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$15.50
No. 2 foundry	$16.50 to 17.00
No. 3 foundry	16.00 to 16.50
Malleable	16.50 to 17.00
Bessemer	16.50 to 17.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sil.	16.50
High phosphorus	16.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Lake Super. charcoal, sil. 1.50, Chicago docks	17.00
S'th'n No. 2 fdy.	17.14
Low phos., sil. 1 to 2, copper free	$28.50 to 29.20
Silver, sil. 8 per cent	24.92
Bess. ferrosilicon, 14-15%	31.42

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., deliv'd	$14.56 to 15.56
Northern malleable, deliv'd	18.80
Northern basic, deliv'd	18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east. N. J.	$17.91 to $18.41
East. Pa. No. 2 fdy	17.02 to 17.52
East. Pa. No. 2X fdy	17.52 to 18.02

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy	$16.00
No. 2X fdy	16.50
No. 1 fdy	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$20.04
*Buffalo, sil. 2.25 to 2.75	20.04
*Ala., sil. 1.75 to 2.25	$20.24 to 20.74
*Ala., sil. 2.25 to 2.75	20.74 to 21.24
†Ala., sil. 1.75 to 2.25	16.88
†Ala., sil. 2.25 to 2.75	17.38

Freight rates: $5.04 all rail; $9.74 all rail from Alabama and $5.88 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	18.02
S'th'n Ohio silvery, 8 per cent	22.01

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.81 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$15.64 to $16.14
East. Pa. No. 2X	16.14 to 16.64
East. Pa. No. 1X	16.64 to 17.14
Basic (del'd east. Pa.)	16.25
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$16.00
S'th'n fdy., sil. 1.75 to 2.25	16.14
Malleable (local delivery)	16.00
Ohio silvery, 8 per cent	23.12
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50
Basic	12.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Prices of Ores and Ferroalloys

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	22c. to 23c.
Tungsten, Chinese wolframite	$11.00 to $11.25
Tungsten, domestic scheelite	9.50 to 10.00

	Per Gross Ton
Chrome, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$18.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic seaboard	20.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$72.00 to $75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00 to $27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (less carload)	85.00
75%	126.00
14% to 16% (f.o.b. Welland, Ont., in carloads)	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$22.00	13%	$24.50
11%	22.50	14%	26.50
12%	23.50	15%	28.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$19.00	11%	$21.50
7%	19.50	12%	22.50
8%	20.00	13%	23.50
9%	20.50	14%	25.50
10%	21.00	15%	27.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	23.50c. to 25.00c.
Ferrochromium, 0.06% carbon	25.50c. to 27.00c.
Ferrovanadium, del., per lb. contained Va.	$3.05 to $3.30
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. Mo., del.	1.00
Calcium molybdate, per lb. Mo., del.	85c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered: 2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Old Material Quotations

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to	$10.50
No. 2 heavy melting steel	9.00 to	9.50
No. 2 railroad wrought	10.00 to	10.50
Scrap rails	10.00 to	10.50
Rails 3 ft. and under	12.00 to	12.50
Sheet bar crops, ordinary	11.00 to	11.50
Compressed sheet steel	9.50 to	10.00
Hand bundled sheet steel	9.00 to	9.50
Hvy. steel axle turnings	9.00 to	9.50
Machine shop turnings	6.50 to	7.00
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
Cast iron carwheels	10.50 to	11.00
Heavy breakable cast	8.00 to	8.50
No. 1 cast	9.50 to	10.50
Railr. knuckles and couplers	10.50 to	11.50
Rail. coil and leaf springs	10.50 to	11.50
Rolled steel wheels	10.50 to	11.50
Low phos. billet crops	13.00 to	13.50
Low phos. sheet bar crops	12.50 to	13.00
Low phos. plate scrap	10.50 to	11.50
Low phos. punchings	10.50 to	11.50
Steel car axles	15.00 to	15.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel	$7.50 to	$8.00
Shoveling steel	7.50 to	8.00
Frogs, switches and guards	7.50 to	8.00
Hydraulic comp. sheets	5.50 to	6.00
Drop forge flashings	5.00 to	5.50
No. 1 busheling	5.50 to	6.00
Rolled carwheels	8.00 to	8.50
Railroad tires	9.00 to	9.50
Railroad leaf springs	8.50 to	9.00
Axle turnings	5.75 to	6.25
Steel couplers and knuckles	8.25 to	8.75
Coil springs	9.50 to	10.00
Axle turnings (elec. fur.)	6.00 to	6.50
Low phos. punchings	10.00 to	10.50
Low phos. plates, 12 in. and under	9.00 to	9.50
Cast iron borings	3.50 to	4.00
Short shoveling turnings	4.00 to	4.50
Machine shop turnings	4.00 to	4.50
Rerolling rails	10.50 to	11.00
Steel rails, less than 3 ft	9.25 to	9.75
Steel rails, less than 2 ft	10.00 to	10.50
Angle bars, steel	8.25 to	8.75
Cast iron carwheels	8.50 to	9.00
Railroad malleable	7.00 to	7.50
Agricultural malleable	7.00 to	7.50
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relay. rails, 65 lb. and up	22.00 to	27.00

Per Net Ton

Iron angle and splice bars	7.00 to	7.50
Iron arch bars, transoms	7.50 to	8.00
Iron car axles	13.50 to	14.50
Steel car axles	10.50 to	11.00
No. 1 railroad wrought	6.50 to	7.00
No. 2 railroad wrought	6.50 to	7.00
No. 1 busheling	5.00 to	5.50
No. 2 busheling	2.50 to	3.00
Locomotive tires, smooth	8.00 to	9.00
Pipes and flues	3.25 to	3.75
No. 1 machinery cast	7.50 to	8.00
Clean automobile cast	7.50 to	8.00
No. 1 railroad cast	6.25 to	6.75
No. 1 agricultural cast	6.50 to	7.00
Stove plate	6.25 to	6.75
Grate bars	5.50 to	6.00
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.00 to	$8.00
No. 2 heavy melting stel	6.00 to	6.50
No. 1 railroad wrought	9.50 to	10.00
Bundled sheets		6.00
Hydraulic compressed, new	7.00 to	7.50
Hydraulic compressed, old	6.00 to	6.50
Machine shop turnings	4.00 to	4.50
Heavy axle turnings	6.00 to	6.50
Cast borings (nom.)		3.50
Heavy breakable cast		9.00
Stove plate (steel works)		7.00
No. 1 low phos. hvy	11.00 to	12.00
Couplers and knuckles	10.00 to	10.50
Rolled steel wheels	9.50 to	10.00
No. 1 blast furnace		3.50
Spec. iron and steel pipe		10.50
Shafting	15.00 to	15.50
Steel axles	15.00 to	15.50
No. 1 forge fire	6.75 to	7.25
Cast iron carwheels	11.50 to	12.00
No. 1 cast	10.00 to	10.50
Cast borings (chem.)	11.50 to	12.00
Steel rails for rolling		10.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.50 to	$8.00
No. 2 heavy melting steel	6.75 to	7.25
Compressed sheet steel	7.00 to	7.25
Light bundled sheet stampings	6.00 to	6.50
Drop forge flashings	6.00 to	6.25
Machine-shop turnings	4.50 to	4.75
Short shoveling turnings	5.75 to	6.25
No. 1 busheling	6.50 to	6.75
Steel axle turnings	7.50 to	8.00
Low phos., billet crops	14.00 to	14.50
Cast iron borings	4.50 to	4.75
Mixed borings and short turnings	4.50 to	4.75
No. 2 busheling	4.50 to	4.75
No. 1 cast	9.00 to	9.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft	15.00 to	15.50
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel		$8.00
No. 2 heavy melting scrap	6.50 to	7.50
Scrap rails	8.00 to	8.50
New hydraul. comp. sheets		6.50
Old hydraul. comp. sheets		5.50
Drop forge flashings		6.50
No. 1 busheling	6.50 to	7.00
Hvy. steel axle turnings	8.00 to	8.50
Machine shop turnings	4.50 to	5.00
Knuckles and couplers		10.00
Coil and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet crops	12.50 to	13.00
Short shov. steel turnings	7.00 to	7.50
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Steel car axles	10.00 to	11.00
Iron axles	12.00 to	12.50
No. 1 machinery cast	10.00 to	10.50
Stove plate	8.25 to	8.50
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	9.00 to	9.50
Industrial malleable	9.50 to	10.00
Railroad malleable	9.50 to	10.00
Chemical borings	9.00 to	9.50

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.50 to	$8.00
Scrap steel rails	8.00 to	8.50
Short shoveling turnings	3.50 to	4.00
Stove plates		6.00
Steel axles		12.00
Iron axles		12.00
No. 1 railroad wrought		6.00
Rails for rolling	9.00 to	9.50
No. 1 cast		9.00
Tramcar wheels	9.00 to	10.00
Cast iron borings, chem	10.00 to	11.00

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy steel	$7.00 to	$7.50
No. 1 heavy melting	6.25 to	6.75
No. 2 heavy melting	6.00 to	6.50
No. 1 locomotive tires	8.00 to	8.50
Misc. stand-sec. rails	7.75 to	8.25
Railroad springs	8.50 to	9.00
Bundled sheets	4.25 to	4.76
No. 2 railroad wrought	6.25 to	6.75
No. 1 busheling	5.75 to	6.25
Cast iron borings and shoveling turnings	4.75 to	5.25
Iron rails	7.00 to	8.00
Rails for rolling	9.25 to	9.75
Machine shop turnings	3.00 to	3.50
Heavy turnings	5.50 to	6.00
Steel car axles	9.50 to	10.00
Iron car axles	14.00 to	14.50
Wrot. iron bars and trans.	5.00 to	5.50
No. 1 railroad wrought	4.75 to	5.25
Steel rails, less than 3 ft	10.00 to	10.50
Steel angle bars	6.50 to	7.00
Cast iron carwheels	6.50 to	7.00
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	5.00 to	5.50
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.00 to	6.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	5.00 to	5.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$4.25 to	$5.50
Heavy melting steel (yard)	2.75 to	3.00
No. 1 hvy. breakable cast	5.00 to	5.50
Stove plate (steel works)	3.00 to	3.50
Machine shop turnings	1.00 to	1.50
Short shoveling turnings	1.00 to	1.50
Cast borings	1.00 to	1.50
No. 1 blast furnace	1.00 to	1.50
Steel car axles	10.00 to	10.50
Iron car axles (nom.)	14.00 to	14.50
Spec. iron and steel pipe		5.00
Forge fire		3.25
No. 1 railroad wrought	5.00 to	5.25
No. 1 yard wrought, long	4.00 to	4.25
Rails for rolling	6.00 to	6.25
Stove plate (foundry)	4.75 to	5.25
Malleable cast (railroad)	6.00 to	6.50
Cast borings (chemical)	8.00 to	8.50

Per gross ton, delivered local foundries:

No. 1 machinery cast		$8.50
No. 1 hvy. cast (cupola size)		6.50
No. 2 cast		5.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$4.00 to	$4.25
Scrap T rails	3.80 to	4.60
Machine shop turnings		1.05
Cast iron borings		1.05
Bundled skeleton, long		2.50
Forge flashings	3.00 to	3.50
Blast furnace scrap		1.05
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	6.00 to	6.50
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$8.75 to	$9.25
No. 1 machinery cast	8.75 to	9.25
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$6.00 to	$7.00
Scrap rails for melting	8.00 to	8.50
Loose sheet clippings	2.75 to	3.25
Bundled sheets	4.75 to	5.25
Cast iron borings	2.75 to	3.25
Machine shop turnings	3.25 to	3.75
No. 1 busheling	4.25 to	4.75
No. 2 busheling	2.50 to	3.00
Rails for rolling	9.00 to	9.50
No. 1 locomotive tires	8.50 to	9.00
Short rails	11.75 to	12.25
Cast iron carwheels	8.25 to	8.75
No. 1 machinery cast	10.00 to	10.50
No. 1 railroad cast	8.75 to	9.25
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Agricultural malleable	8.00 to	8.50
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting	$5.50 to	$6.00
Borings and short turnings	3.25 to	3.75
Long turnings	2.75 to	3.25
No. 1 machinery cast	8.50 to	9.00
Automotive cast	10.75 to	11.25
Hydraul. comp. sheets	5.50 to	6.00
Stove plate	4.50 to	5.00
New No. 1 busheling	4.50 to	5.00
Old No. 2 busheling	3.00 to	3.50
Sheet clippings	3.00 to	3.50
Flashings	4.75 to	5.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10 00
Stove plate	10.00	8.00
Standard carwheels	11.00	8 50
Malleable	10.00	8.00

Warehouse Prices for Iron and Steel Products

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.75c.
Rail steel reinforcement—	
For buildings	1.55c.
Road slabs, bridges, culverts	1.40c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
Bands, 7/8 in. (in. Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (7/8 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Coach and lag screws	73
Hot-pressed nuts, sq., tap. or blank	73
Hot-pressed nuts, hex., tap. or blank	73
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex	3.10c.
Cold-fin. flats and sq	3.60c.
Hoops and bands, No. 12 to 7/8 in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
No. 9 ann'l'd wire, per 100 lb	$2.25
No. 9 galv. wire, per 100 lb	2.70
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb	10.25

	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq	3.65c.
Rounds and hex	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.45
Black wire, base per 100 lb	3.20

NEW YORK

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin shafting and screw stock:	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Common wire nails, base, per keg	$2.50
Tire steel, 1/2 x 1/2 in. and larger	3.40c.
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
3/4 x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
1/2 x 6 in. and smaller	65 to 65 and 10
3/4 x 20 in. and smaller	65 to 65 and 10

	Per 100 Ft.
Boiler Tubes:	
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.

	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	73
Less than 200 lb	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	73
Less than 200 lb	63

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates and struc. shapes, 1/4-in. and heavier	2.80c.	3.00c.	2.50c.
Soft steel bars	2.80c.	3.00c.	2.50c.
Reinforcing bars	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.00c.	4.00c.
Hot-rolled sheets (No. 10)	3.40c.	3.50c.	3.50c.
Galv. sheets (No. 24)	4.40c.	4.20c.	4.50c.
Struc. rivets, 1/2 in. and larger, less than 1000 lb	5.00c.	5.00c.	5.50c.
Cold-finished steel bars and shafting:			
Rounds	5.25c.	.....	.....
Square and hexagon	6.25c.	.....	.....
Flats	6.75c.	.....	.....
Common wire nails, base per keg in less carloads	$2.75	$2.75	$2.75

Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials.

Cold-finished steel bars and shafting, subject to warehouse differentials for quantity.

PITTSBURGH

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	70 and 10 per cent off list
Machine bolts, 100 count,	70 and 10 per cent off list
Carriage bolts, 100 count,	70 and 10 per cent off list
Nuts, all styles, 100 count,	73 and 10 per cent off list
Large rivets, base per 100 lb	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb	2.75
Common wire nails, per keg	2.25
Cement coated nails, per keg	2.25

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

PHILADELPHIA

	Base per Lb.
Plates, 1/4-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform	2.30c.
Cold-fin. steel, rounds and hex	3.30c.
Cold-fin. steel, sq. and flats	3.80c.
Steel hoops	3.15c.
Steel bands, No. 12 to 7/8-in., inclu.	2.90c.
Spring steel	5.00c.
Hot-rolled box annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.00c.
Hot-rolled blue annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, 1/4 in.	5.10c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

BOSTON

	Base per Lb.
Plates	*3.35c.
Structural shapes	*3.35c.
Soft steel bars, small shapes	*3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Spring steel, open-hearth	5.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Rustless Steel, Pneumatic-Tired Car, To Be Built for American Railways

A PNEUMATIC tired, self-powered, rustless steel railway car is nearing completion in the Philadelphia plant of the Edward G. Budd Mfg. Co. This company has signed a contract with Michelin et Cie, of France, giving it the right to develop and sell in this country the Michelin car, which recently aroused world-wide interest after successful tests abroad. The French product will take on various refinements and improvements as a result of developments in the use of light gage rustless steel recently completed by Budd engineers.

"This new type railway car, which can be powered by Diesel electric motors, gasoline-electric or gasoline mechanical drive, represents an engineering conquest of superfluous weight," officials of the Budd company point out. "The average Pullman parlor car weighs 5000 lb. per passenger, whereas the new car weighs only 325 lb. per passenger. Moreover, this new development solves the problem of running a pneumatic-tired car on rails, as a result of which it will set new standards of riding comfort. Riding in a car of this type will be just like gliding. However, this feature is purely secondary. The real advantage of this car is that it promises to end a dilemma which has confronted the railroads for some time, particularly so since the bus has offered them such serious competition. Railroad equipment has become heavier and heavier, until now even the locomotive weighs from 300,000 lb. to 600,000 lb. and a day coach 140,000 lb. The factor of superfluous weight has had much to do with making passenger carrying unprofitable.

"We now have a product which is light, relatively inexpensive and economical to operate, smooth and easy riding, noiseless, durable and exceptionally safe. Obviously the development of such a vehicle holds much promise for the railroads. Our rail car has been developed in collaboration with competent railway authorities and some of the country's leading rail officials are greatly interested in the development."

The Pennsylvania and Reading roads have offered the Budd company several miles of track on which to conduct test runs. The new car, constructed entirely of rustless steel, seats 40 persons and is expected to have a top speed of more than a mile a minute. Structurally the vehicle combines new engineering thoughts and ideas. Strength is added to the structure itself by the shape and form of the various rustless steel parts, the fabrication of which has been possible only through the development of a new method of welding this metal.

Steel, having a tensile strength of 150,000 lb. per sq. in., has been used to provide an even greater safety factor than that found in standard car construction. The technique employed was developed recently after three years of research by Budd engineers, under the supervision of Col. E. J. W. Ragsdale. The new system of welding is known as "shot welding," and owes its success to the precise control of current time and pressure of the weld.

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Copper Duty Proposed in House Bills

WASHINGTON, Jan. 12.—Representative James of Michigan and Representative Evans of Montana have introduced bills providing duties of 6c. and 4c. per lb. respectively on copper. A number of bills also have been introduced in Congress for duties on crude oil and refined products.

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Exhibit Mill Which Rolls 72-in. Cold Strip

The new tandem four-high cold strip mill for the Otis Steel Co., Cleveland, which will produce steel strips 72 in. wide, the greatest width ever rolled cold in any metal in the form of strip or by the continuous method, was exhibited to several hundred engineers by the United Engineering & Foundry Co., the builder, at its Youngstown plant on Jan. 6. In addition to construction improvements of a mechanical and electrical nature, the mill is equipped with a number of auxiliary machines never before used, which will tend to revolutionize cold rolling methods for wide metals.

A patented uncoiler receives the coils as they come from the hot strip mill, detaches one end of the coil and delivers it into the continuous cold mill. A new type of guide on the mill works in conjunction with this operation. The strip then passes through the different mills in the tandem, and is then taken by another new invention, the reel guide machine, which automatically delivers it on to the cold strip reel. When it is fully wound, the drum of the reel collapses, permitting the material to be removed. The final product is delivered with no manual operation other than the use of control buttons.

Also exhibited was a new twin-motor cold strip mill, another of the series of experimental units constructed by United Engineering to demonstrate revolutionary changes in rolling mill practice. In this machine the conventional pinion stands and gear drives of earlier usage have been completely discarded, and the mill is driven by two synchronized motors, one for each of the two working rolls. The mill is of the four-high type, but so flexible in its application that it duplicates almost any desired strip rolling condition. It can be operated with almost any size or type of working rolls and quickly changed from one to another. It works at various speeds and also has the automatic reel equipment.

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Electric Storage Battery Has New Cleveland Plant

The Electric Storage Battery Co., manufacturer of Exide batteries, Philadelphia, has moved its Cleveland offices and assembly plant to a new building at 6400 Herman Avenue, N.W., in the latter city. For years the sales and engineering staff occupied quarters at Chester Avenue and East Twenty-fourth Street, while the assembly plant was located at 5121 Perkins Avenue. Both these departments are now housed in the new plant. H. F. Sauer is manager.

The plant is modern and efficiently arranged. It has its own railroad siding, with the receiving platform at car-door level and shipping platform at tail-gate height, facilitating the loading and unloading of trucks without lifting and lost motion.

Here Exide-Ironclad batteries will be assembled for electric industrial trucks, tractors, street trucks and locomotives. The many other types of batteries which the company produces will also be assembled at Cleveland, including Exide automobile batteries as well as those designed for railway signaling, car lighting, telephone, emergency lighting, etc.

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Trackwork Shipments Better in December

Production and shipments of trackwork for T-rail track of 60 lb. and heavier increased to 2373 net tons in December, from 1948 tons in November, according to the American Iron and Steel Institute. This was the first advance since March and the highest month's total since that of September. In December, 1930, the output was 5174 tons.

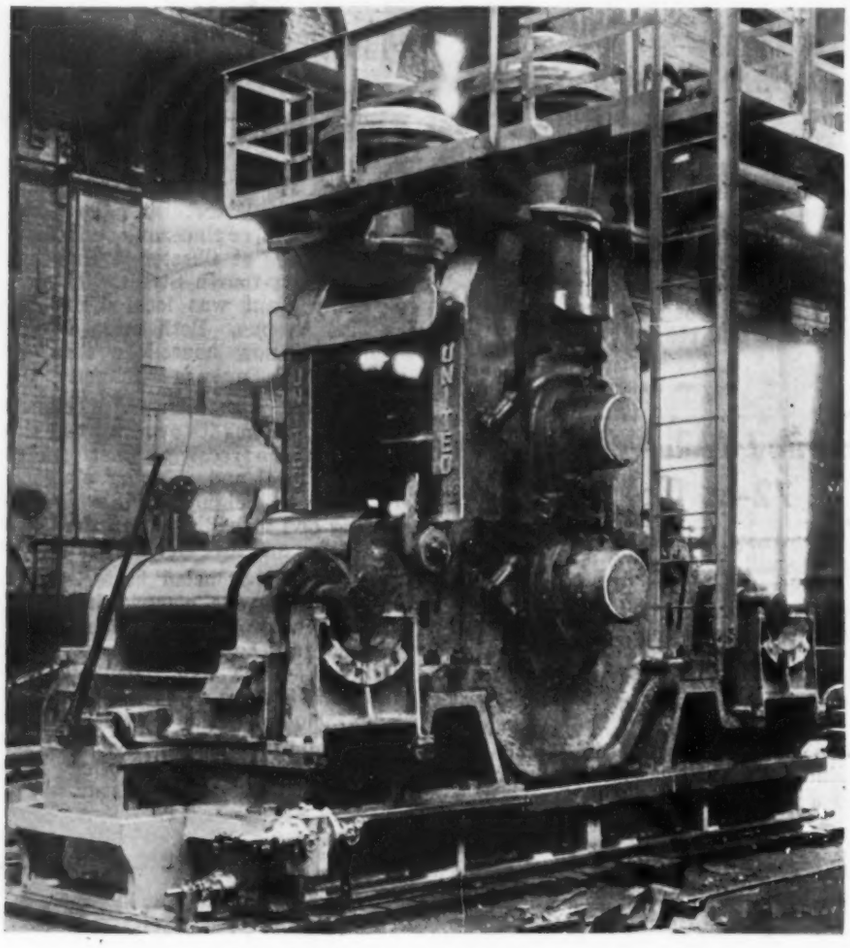
Total output for the year was 60,901 tons—the lowest since these records have been compiled. It compares with 110,116 tons in 1930 and with the high record of 197,005 tons, made in 1926. In 1929 the total was 162,115 tons.

Cold Rolling Strips by the Steckel Process

(*Concluded from page* 171)

tween the main gears as in the 26-in. mill. Each reel of the 38-in. mill is driven by its own motor, which, when a reel is uncoiling, acts as a dynamic brake restoring a small amount of energy to the motor-generator set. A special form of motor-generator set, however, is required for the two-motor drive, in order to get satisfactory results at all strip speeds and stages of the rolling pass.

Screw Down.—With the exception of the 38-in. mill, all mills thus far built are of the horizontal screw and wedge type as regards screw down. In the case of the 7½-in. mill, the wedge is used as a stationary nut with a revolving screw, whereas in the case of the 26-in. mill, the screw is attached to the wedge and the nut, which is formed in the hub of a worm wheel, revolves. In the first case the drive is through spur gears with a high and low gear obtained by shifting. In the second case the drive is through two sets of worm gears. On some of the earlier mills screw downs were manually driven, but these are now being replaced by motor drives. Arrangements are provided for operating screws independently of one another so as to make corrections for insuring equal draft on both sides of the strip. The vertical screw down of the 38-in. mill does not differ essentially from those usually employed on cold-strip mills.



Each reel of the 38-in. mill is driven by its own motor. The screw-downs are of the vertical type.

Applications of the Steckel Mill

The Steckel mill, which is built by the Cold Metal Process Co., Youngstown, is now in use for the production of strip of a variety of materials and for many different purposes. Steel strip 36 in. wide by 0.003 in. in thickness has been rolled without annealing from strip 0.065 in. in thickness. The same mill produces as a regular product strip for a manufacturer of tin plate averaging 28 in. wide by 0.0095 in. thick. On another but smaller mill there is made occasionally, when required, steel strip 6 in. wide by 0.001 in. thick without intermediate anneal from strip 0.010 in. thick. Strip 6 x 0.002 in. is often produced from 6 x 0.080 in. and 6 x 0.010 in. from 6 x 0.160 in.

A number of mills are engaged in rolling stainless steel for automobiles and airplanes. Most of this is rolled from 0.093 in. to 0.0184 in. without intermediate annealing. For airplane wings some stainless steel 18½ in. wide by 0.007 in. thick was rolled from 0.0125 in. without anneal and under high back tension, resulting in material of practically perfect flatness and extremely high physical properties.

Copper 6 in. wide and 3/16 in. thick has been rolled without anneal to 0.004 in., and regular practice on one mill is to roll copper ⅛ in. thick to 0.004 in. Other Steckel mills are now in use rolling steel strip for boxing strap and other products, much of which is 0.020 in. thick when finished, from strip of No. 12 gage. High carbon razor steels, brass, nickel and monel metal are being produced on Steckel mills. Aluminum and zinc have been rolled experimentally with success.

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Rotating the Force in the Drafting Room

(*Concluded from page* 167)

The shorter working day is calculated to bring such economies as reduced electricity consumption for lighting the drafting room, less heat, fewer mistakes on the part of the men, generally higher grade work all round due to less fatigue, etc. There are also contingent advantages to the men, such as better esprit de corps of the organization. They would have considerably more leisure, such as time for garden work, with all that this makes for health improvement.

Demands of increased industrial activity will first be met by omitting the staggering or rotation of work, and then if necessary the work day may be lengthened to the full day without having to expand the force, only to reduce it again on a downward swing in business.

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Industrial Brownhoist Corpn., Cleveland, shortly will move its executive offices to Bay City, Mich., where its principal manufacturing plant is located. This move will consolidate not only the executive management of the corporation at the plant, but also sales, engineering, purchasing and accounting. G. L. Harman has resigned as sales manager of the company, and sales hereafter will be handled directly by Alexander C. Brown, president. A district sales office will be retained in Cleveland at the present address of the corporation.

British See End of Crisis in Probable German Default

French Provide Free Transport to Departing Foreign Workers; Welsh Mills Discuss Unique Output Restriction Plan

(*By Cable*)

LONDON, ENGLAND, Jan. 11.

THREATENED default by Germany is regarded in many quarters here as envisaging the end of the protracted world economic crisis. Markets are improving following the holiday lull, but business is still small.

While there is a slightly improved demand for Continental finished steel, and prices are firmer following withdrawal of several large Belgian sellers, the market is still in a critical condition.

Unemployment in Germany is placed at 5,666,000, and this is being increased by further large dismissals of miners and steel workers. The enforced reduction of domestic prices by the Government's emergency decree has placed steel makers in a worse position.

Financial conditions in Lorraine are increasingly difficult and French production is declining. Free railroad transportation is being granted to foreign workers in France who desire repatriation, and French industrial workers, who wish to enter into agricultural employment, are also carried without charge.

The demand of Swedish employers that wages of engineers and ironworkers be reduced has been rejected and a strike is not unlikely.

French steel mills have agreed to control under a quota plan, effective for three years and based on their output in 1929 to 1930. Works in the Saar have been provisionally granted a quota of 500,000 tons in the cartel. It has also been proposed to renew existing sales offices for three years and to establish additional branches.

The International Wire Export Co. is now functioning in Brussels with a total quota of 718,000 tons, of which Germany has 53 per cent. Despite British competition, the company does not intend to reduce prices.

Welsh tin plate is firm in price with business moderate and inquiry expanding, including good prospective business from Argentina and Australia. First quarter tin plate bookings have been fairly satisfactory.

Mills are considering a new proposal for restriction of output. Under this plan, individual companies would periodically declare the number of mills they desire to operate in an ensuing quarter.

On such a basis, idle mills in a quarter would be compensated from a fund provided by the mills in operation. Maximum output for a definite period would be ascertained, and it would be necessary for works to sell at low prices to maintain full production on mills declared for operation.

A proposal has been made to establish a large canning industry in Manchester, which would utilize local products.

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German Plants Continue Wholesale Dismissals

HAMBURG, GERMANY, Jan. 2.—There is some disappointment in industry that the emergency acts of the Government in reducing wages and cost of living generally have not brought improvement. Dismissal of employees is accelerating. During the recent holiday week the entire staff and operatives of the August Thyssen Hütte, about 9000 in all, were dismissed for an indefinite period. The Niederrheinische Hütte has dismissed one-third, the Duisburger Kupferhütte one-fourth, and the Manstedtwerke-Klockner works one-third of all employees. Other plants have also reduced working forces. This wholesale reduction of operations is attributed to the impossibility of continuing the recent high percentage of export business.

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Machinery Manufacturers to Discuss Resins

HAMBURG, GERMANY, Jan. 2.—German machinery builders have recently been using increasing quantities of synthetic resins for machine parts. The Federation of Machinery Manufacturers will shortly send a delegation to the United States to confer with American builders on practices for employment of this plastic material in machinery.

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Pueblo Steel Plant To Resume Operations

PUEBLO, COLO., Jan. 12.—Operations in five major departments of the Pueblo steel mills, affecting more than 1000 employees of the Colorado Fuel & Iron Co., will be resumed within a week, according to announcement made by L. F. Quigg, general superintendent. Departments affected will be the pipe foundry, open-hearth, blast furnace, coke plant and rail mill. The rail mill will roll the 32,500-ton order for the Atchison, Topeka & Santa Fe.

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University of Wisconsin Extension Division, Madison, Wis., is offering a correspondence-study course in engineering economics, available for home study to students in any State.

British and Continental European Export Prices f.o.b. United Kingdom and Continental Ports

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton, £ at $3.35

Ferromanganese, export	£9	0s.				$30.15		
Billets, open-hearth	5	7½	to	£5	12½s.	18.00	to	$18.84
Black sheets, Japanese specifications	9	7½	to	9	10	31.40	to	31.82
Tin plate, per base box	0	14	to	0	14½	2.34	to	2.39
						Cents a Lb.		
Steel bars, open-hearth	7	17½	to	8	7½	1.18	to	1.25
Beams, open-hearth	7	7½	to	7	17½	1.10	to	1.18
Channels, open-hearth	7	12½	to	8	2½	1.14	to	1.22
Angles, open-hearth	7	7½	to	7	17½	1.10	to	1.18
Black sheets, No. 24 gage	8	0	to	8	10	1.20	to	1.27
Galvanized sheets, No. 24 gage	9	0	to	9	5	1.36	to	1.38

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£2	8s.				$11.66		
Wire rods, No. 5 B.W.G.	5	5				25.51		
Black sheets, No. 31 gage, Japanese	11	5				54.68		
						Cents a Lb.		
Steel bars, merchant	2	13½	to	£2	14s.	0.58	to	0.59
Beams, Thomas	2	14				0.59		
Angles, Thomas, 4-in. and larger	2	13	to	2	14	0.58	to	0.59
Hoops and strip steel over 6-in. base	3	15	to	3	17½	0.83	to	0.84
Wire, plain, No. 8	5	7½				1.18		
Wire, barbed, 4-pt., No. 10, B.W.G.	8	15				1.93		

Machine Tool Trade Still in a Lull

Influences That Retarded Business in December Are Still in Effect—Sales and Inquiries Few

MACHINE tool trade throughout the country is still markedly under the influences that caused a sharp curtailment of buying in November and December. There are no indications yet of a revival in activity.

In some markets some inquiries have appeared, but sales thus far in the new year are few. However, a good deal of business, on which quotations were made late last year, is pending, with prospects that some of it will be placed when signs of general recovery are observed.

Two lists, each of about 25 machines, are pending in the New York market, but these constitute the bulk of new prospects. At Cleveland, interest centers in a list of 45 wood-working machines for Wright Field, Dayton, on which bids closed Monday. Some automobile buying is believed to be under consideration in Chicago.

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New York

Aside from an inquiry for about 25 machine tools for a company not directly connected with the metal-working industry, the local machine tool market has exhibited no signs of a change from the marked inactivity of December. The above-mentioned inquiry and one from the General Electric Co. for upward of 20 machines for a Springfield, Mass., service shop constitute the bulk of prospective business in this section.

Cleveland

No signs of a revival of activity in machine tools have appeared so far this month. Orders and new inquiries are more plentiful than during December. However, the trade has hopes that some of the business that has been in prospect for many weeks will be placed now that the new year has started. Bids for 45 wood-working machines for the Air Corps, War Department, Wright Field, Dayton, Ohio, for which an inquiry was sent out several weeks ago, were opened Monday.

New England

Machine tool builders in this district are securing some business from automobile and special machinery builders, but not enough to increase plant operations.

Pittsburgh

While some machine tool dealers in this district report a few sales since the first of the year, demand has not changed materially and live inquiry is still lacking. Sales of small tools and mill supplies have been slightly heavier in the last week or two, but do not represent any significant volume. This also can be said of repair parts, sales of which indicate a continuance of last year's tendency to postpone purchases of new equipment.

Prospects for heavy machinery and equipment are not particularly good, as steel companies are definitely committed against further expansion of facilities, and most of them hesitate to make expenditures for more diversification at the present time. The crane market is also dull, and machinery lists from larger buyers in the district are lacking.

Chicago

The trade is still marking time, with practically no expansion either in sales or new inquiries. There is still no hint of what the railroads will need in the new year, but there is reason to believe that some automobile builders will enter the market for machine tools for new cars that will be added to existing lines. Here and there a farm implement manufacturer has plans, but no set time for them to mature.

Cincinnati

While machine tool manufacturers report inquiry good, users' interest in retooling rarely goes beyond requests for quotations. Plants are being operated at about 30 per cent of capacity. The few scattered orders received the past week indicate no trend change.

A southern Michigan school board has bought nine small lathes from a local manufacturer.

Milwaukee

The first business week of the new year was encouraging, although the actual volume transacted was rather meager. Inquiry was more active than in any week in December, which was the first month since August that brought out a real semblance of interest on the part of tool users in acquisition of new equipment. Current sales are limited almost entirely to replacements. Industrial construction remains dull, but a number of projects are in abeyance which await only the first definite signs of general improvement for going forward.

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◀ NEW YORK ▶

Continental Can Co., 1 Pershing Square, New York, plans three-story plant at Harvey, La., to serve food products factory of Penick & Ford, Ltd., on adjoining site. Cost over $175,000 with equipment. Favrot & Livandais, Hibernia Building, New Orleans, architects.

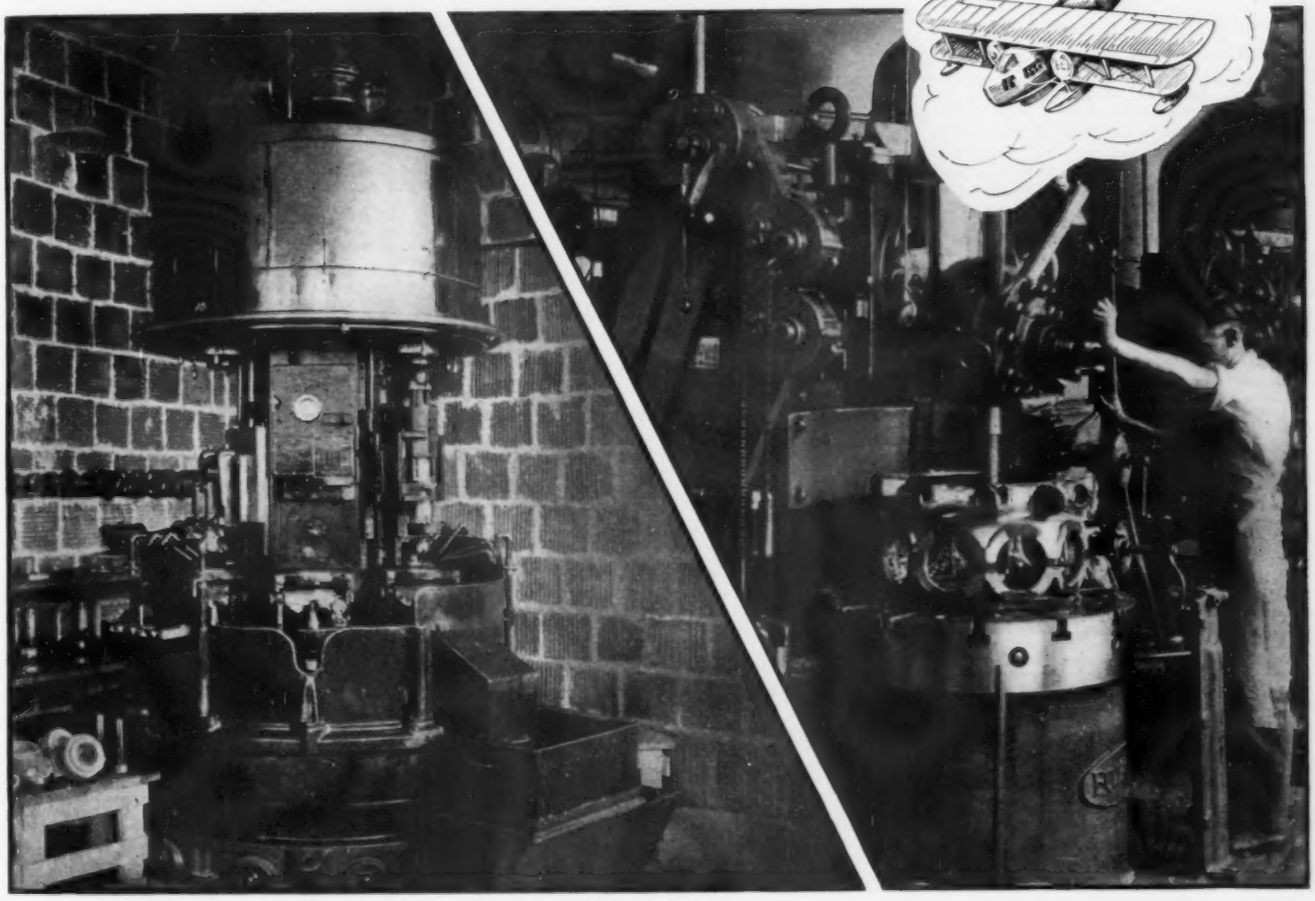
Port of New York Authority, 80 Eighth Avenue, New York, has authorized appropriation of $10,670,415 for construction work in 1932, including multi-story inland terminal building now under way. John E. Ramsey is general manager.

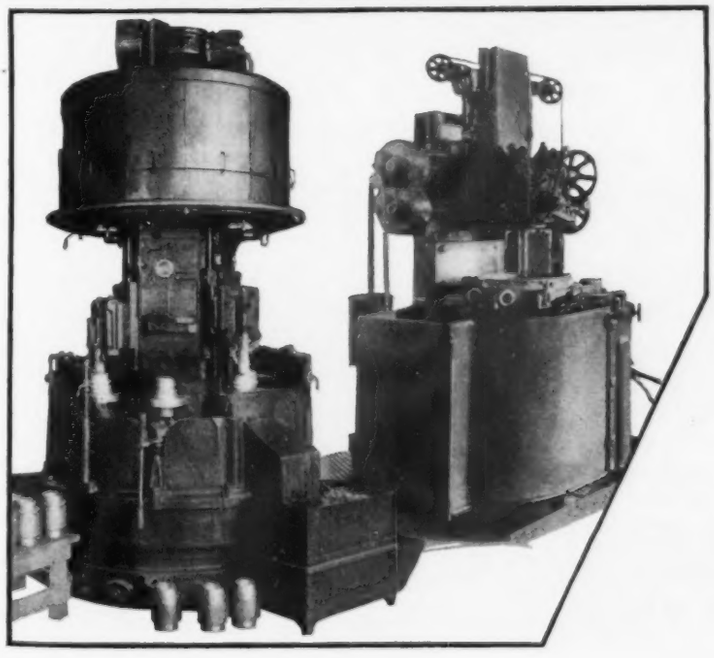
Construction Quartermaster, United States Army, Mitchel Field, Long Island, has work under way for Government air depot, including four double hangars, one-story machine shop, assembling shop, two steam boiler plants, maintenance building, storage and automobile service buildings, radio building and other units. Cost about $850,000 with equipment. Appropriation of $5,000,000 has been arranged for program, of which $2,956,645 has been used.

Schlecker & Son Iron Works, Inc., Brooklyn, has been organized by Jack and Samuel Schlecker, 491 East Fifty-second Street, to operate general iron works. It is understood that company will succeed to and expand Schlecker & Alper Iron Works, Inc., 1982 Pitkin Avenue, Brooklyn.

Refined Macaroni Co., 421 Rodney Street, Brooklyn, has asked bids on general contract for one-story equipment shop, service and garage building, 40 x 100 ft. Laspia & Samenfeld, 217 Havemeyer Street, architects.

THE BULLARD METHOD on Airplane Engines





Increasing competition demands lower manufacturing costs. In order to meet these conditions Airplane Engine Shops have selected the best method for their needs.

Bullard Mult-Au-Matics and Vertical Turret Lathes operating on this class of work are justifying the investment in these units.

Ask for Economy Facts about The Bullard Method as applied to your work.

THE BULLARD COMPANY
Bridgeport Connecticut

New York, Ontario & Western Railway Co., 370 Lexington Avenue, New York, plans rebuilding part of car repair shops, at Middletown, N. Y., recently destroyed by fire. Loss over $200,000 including equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, and Naval Supply Depot, Brooklyn, asks bids until Jan. 19 for 2350 pneumatic chisels, electric pumps, ring cowls, cable and other equipment for Brooklyn navy yard.

Board of Water Supply, 346 Broadway, New York, asks bids until Jan. 27 for quantity of 48, 36, 16, 8, 6 and 5-in. bronze gate valves, 36 and 24-in. bronze flap valves, and 6-in. bronze check valves for City Tunnel No. 2 (Contract 234). Benjamin F. Einbigler, secretary.

Bureau of Public Buildings, Borough Hall, Brooklyn, plans one-story equipment storage, service and repair building, 60 x 100 ft. Cost over $35,000 with equipment. J. M. Coleman, 341 Madison Avenue, New York, architect.

DeLuxe Machinery & Mfg. Corpn., Troy, N. Y., has been organized by William T. Sherman and Frank Mealy, 102 Second Avenue, Upper Troy, to manufacture machinery and parts.

New York Telephone Co., 140 West Street, New York, has authorized appropriation of $10,513,265 for new construction in different parts of State, including buildings, station equipment, line extensions, etc., of which about $3,862,700 will be used in Manhattan Borough.

Union Free School District No. 7, Poughkeepsie, N. Y., contemplates manual training department in new school to cost over $200,000. E. C. Smith, 39 Market Street, Poughkeepsie, architect.

Commercial Solvents Corpn., 230 Park Avenue, New York, is carrying out reconditioning and improvement program at plant at Peoria, Ill., closed for about six months. It is planned to resume production on capacity schedule soon.

J. L. Hammett Co., 380 Jelliffe Avenue, Newark, N. J., manufacturer of school equipment and supplies, asked bids on general contract for two-story addition. Cost over $30,000 with equipment. Holden, McLaughlin & Associates, 670 Fifth Avenue, New York, architects.

Smith Tractor & Equipment Co., Irvington, N. J., recently organized and referred to in these columns, will take over E. & F. Smith Co., 113-07 175th Street, Jamaica, L. I., dealer in cranes, shovels, buckets, etc. New company will represent Caterpillar Tractor Co., Peoria, Ill., and has leased one-story building at 212 Colt Street, Irvington, for distributing plant for graders, road machines, parts, etc. New works will include machine shop for engine rebuilding, rebabbitting, cylinder grinding, and for rebuilding construction equipment. Edwin H. and Fred C. Smith, are president and vice-president, respectively.

Healey Sewer Equipment Co., Inc., 58 Elm Street, Newark, manufacturer of forms and equipment for sewer, tunnel and similar construction, has purchased building at Rome and Niagara Streets, for plant.

Board of Education, Cranford, N. J., contemplates manual training department in new three-story and basement high school. Cost over $160,000. H. B. Brady, Inc., 333 North Broad Street, Elizabeth, N. J., architect.

Star Electric Motor Co., 140 Miller Street, Newark, manufacturer of electric motors and parts, will soon begin erection of one-story plant, 160 x 220 ft. Cost about $75,000 with equipment. W. H. Jackson, 1841 Broadway, New York, architect; J. Di Stasio & Co., 136 Liberty Street, New York, engineers.

PHILADELPHIA

United Gas Improvement Co., 1401 Arch Street, Philadelphia, has authorized fund of $28,000,000 for additions and improvements in electric and gas properties, including power plants, transmission lines, and other construction. Largest expenditures include Philadelphia Electric Co., $20,520,000, with portion carried over for uncompleted 1931 projects; Connecticut Electric Service Co., Hartford, $3,400,000; Luzerne County Gas & Electric Corpn., Kingston, Pa., $474,700; Commonwealth Utilities System, $879,000; and New Haven Gas Light Co., New Haven, $256,400.

Pennsylvania Railroad Co., Broad Street Station, Philadelphia, plans rebuilding certain units of repair shops at Altoona, Pa., recently destroyed by fire, with loss over $1,000,000.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Jan. 22 for three automatic screw machines for 0.30 armor-piercing steel cores (Circular 278).

State Board of Education, State House, Trenton, N. J., asks bids on general contract until Jan. 21 for two-story and basement shop at New Jersey School for Deaf, Trenton Junction. Appropriation of $75,000 made. Guilbert & Betelle, 20 Branford Place, Newark, N. J., architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 19 for gasoline engine-driven centrifugal pump (Schedule 7206); until Jan. 26 for quantity of searchlights, space springs, parts, etc. (Schedule 7252), for Philadelphia Navy Yard.

Delaware Electric Power Co., Wilmington, Del., will expend $1,377,000 for extensions and improvements in electric and gas properties, including power substation to cost $200,000 with equipment, transmission lines, gas pipe lines and other construction.

Edward G. Budd Mfg. Co., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, specializing in production of steel automobile bodies, has secured rights from Michelin & Cie, Ltd., Paris, for manufacture in United States of self-powered stainless steel railway cars with pneumatic tires. Units will be operated by Diesel-electric motors or gasoline-electric power equipment. Production at plant has been increased for automobile bodies with current payroll about twice that of January, 1931.

Lycoming Mfg. Co., Williamsport, Pa., manufacturer of automobile engines, subsidiary of Cord Corpn., Auburn, Ind., is doubling production in foundry, with increased working quota.

Crooke, Burnett & Co., York, Pa., has been organized to manufacture special machinery, foundry products and machined parts and to fabricate plate and structural steel. Company is represented in New York district by Paul G. Koch, 50 Church Street, and in Chicago territory by McGann Mfg. Co., 332 South Michigan Avenue.

NEW ENGLAND

Forestville Mfg. Co., Forestville, Conn., organized by Peter Person and associates to manufacture mechanical specialties, let contract to James E. Collins, Bristol, for one-story plant, 20 x 80 ft. Automatic and other machinery will be installed. Mr. Person was formerly superintendent for National Marine Lamp Co., Forestville.

General Electric Co., Schenectady, N. Y., will develop plant at Springfield, Mass., largely for manufacture of transformers and kindred electrical equipment. Plans are under way for removal of electric porcelain plant at Springfield to Schenectady.

School Board, Melrose, Mass., plans installation of manual training department in new multi-story high school. Bids are being asked on general contract until Jan. 20. Cost over $575,000. J. William Beal Sons, 185 Devonshire Street, Boston, architects.

Alliance Machine & Tool Co., 15 East Grand Avenue, New Haven, Conn., has been organized to manufacture machinery and tools. Ernest Schneider is president, Alfred Schneider, vice-president.

Hartford Electric Light Co., Hartford, Conn., is arranging for expansion and improvements to cost about $1,000,000, including increased power facilities, transmission lines, and other construction.

Ace Art Co., 12 Gould Street, Boston, manufacturer of photographic equipment and supplies, asked bids on general contract for one and two-story addition to plant to Reading district, including improvements in present factory. Cost about $35,000 with equipment. David J. Abrahams, 260 Tremont Street, Boston, architect.

Marvel Blade Sharpener Co., Inc., New Bedford, Mass., has been organized with capital of $35,000 to manufacture razor blade sharpeners and kindred products. Edgar J. Fournier is president; Raymond E. Lefebvre, 16 Robeson Street, treasurer.

Habirshaw Wire & Cable Co., Bridgeport, Conn., is discontinuing operations at local plant and will remove equipment to works at Yonkers, N. Y., where manufacture will be expanded.

Pratt & Whitney Aircraft Co., Hartford, Conn., has secured contract from Army Department for 36 Hornet type and 20 Wasp Junior aircraft engines and spare parts, totaling $299,198, and will advance production schedule.

Stanley Tools, New Britain, Conn., has purchased rule business of Hiram A. Farrand, Inc., Berlin, N. H.

Tubular Products Co., Southington, Conn., manufacturer of brass tubing for automobiles and aircraft, has been purchased by a group of local men, who plan equipment revamping and purchases.

Locke Steel Chain Co., Bridgeport, Conn., has received orders for power lawn mowers that will keep the plant running until July 1.

Boston & Albany Railroad, has reopened its West Springfield locomotive repair shops with a full quota of 400 workers on a four day week schedule. Company has inquiries out for equipment, but will not make purchases at present.

Arrow-Hart & Hegeman Electric Co., Hartford, Conn., electric wiring and switch devices, are equipping a branch plant at Toronto, Ont., and expect to start operations about Feb. 1.

SOUTH ATLANTIC

Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until Jan. 19 for quantity of steel tubing, steel wire, stable arc welding rods, etc. (Circular 60); for quantity of copper wire, brass rods, etc. (Circular 61).

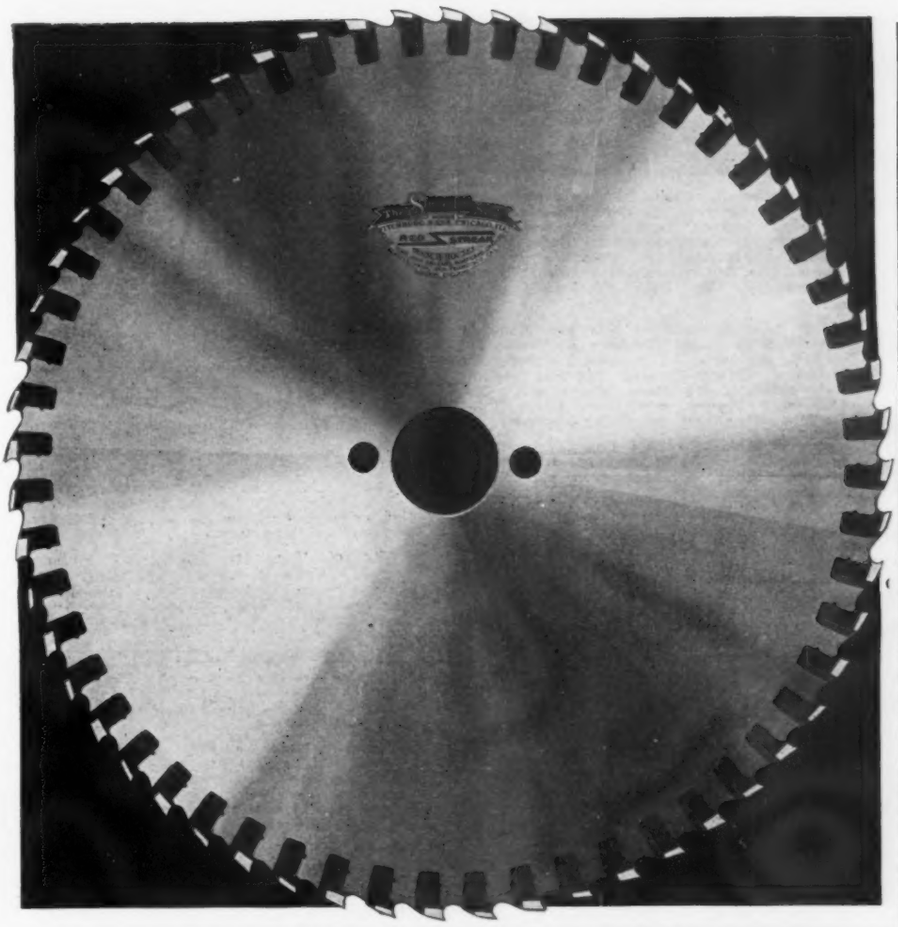
Greyhound Lines, Inc., 1783 East Eleventh Street, Cleveland, operating interstate motor bus system, has leased one-story building, 85 x 300 ft., to be built by Kass Realty Co., 1116 Vermont Avenue, Washington, for new terminal, service and garage building. Cost close to $100,000 with equipment.

Champion Fibre Co., Canton, N. C., has superstructure under way on one-story machine building, 110 x 352 ft., and one-story heater room, 54 x 120 ft., in connection with $1,000,000 expansion and improvement program. Work will soon begin on one-story finishing building. Morton C. Tuttle Co., 31 St. James Avenue, Boston, general contractor. Contract has been let to W. W. Boxley Construction Co., Roanoke, Va., for dam on West Fork of Pigeon River, 525 ft. long and 50 ft. high, for water service at mill.

West Point Foundry & Machine Co., West Point, Ga., recently organized, has taken over plant and property of West Point Iron Works, closed several months ago, and will resume production at once.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Jan. 27 for 200,000-gal. steel water tank on 100-ft. steel tower (Specification 6758), and for 2,000,000 cu. ft. capacity gas holder, four-lift telescope type (Specification 6768), for naval air station, Sunnyvale, Cal.; until Feb. 3 for helium and boiler plant building, medium pressure helium storage structure, inverted syphon and gas holder foundation (Specification 6706), Sunnyvale station; two 25-ft. floating revolving boom cranes for destroyer bases, Mare Island and San Diego, Cal., cranes operated by Diesel-electric power (Specification 6770).

Chesapeake & Potomac Telephone Co., 5 Light Street, Baltimore, plans construction and improvement program in Maryland, Vir-



SIMONDS

INSERTED TOOTH METAL SAWS

FASTER speed, faster feed and elimination of over 50 per cent of the usual metal sawing troubles are results obtained when your machine is equipped with that new Simonds Inserted Tooth Metal Cutting Saw—the blade with the curved gullets and scientifically arranged teeth of high speed steel. It is economical in operation and slices through tough metal with ease. There is no welding of chips to the teeth or sides of the blade—therefore no broken or cracked saw plates.

For information about this saw or about any of your metal sawing problems write us. Our engineers are at your service.

SIMONDS SAW and STEEL CO.

World's Largest Saw Makers

Established 1832 FITCHBURG, MASS.

HAVE YOU HEARD?

Chemist out in California excitedly announced the other day that he had found the missing "element 87." We've been so busy making perfect files that we didn't know it had been misplaced.

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At New Haven the Yale bulldog certainly chewed that tough Princeton tiger, a few Saturdays ago, but it was nothing to what one of those new Red Streak curved gullet Simonds Saws does any day to the toughest metal you can trot out on the firing line.

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No. There are no other hack saws with the Red End. Simonds Tungsten Steel blades are the only ones that have this trade mark of quality. Your Uncle Samuel knows all about that. He registered it at Washington for us.

❖ ❖ ❖

It may be true that some politicians should make good football players because they're expert at blocking and interfering. But keep your mind clear on this fact—Simonds Metal Band Saw slices thru hard metal so speedy and clean that every man in the shop has joined the cheering section.

❖ ❖ ❖

Traveler in Mexico had trouble getting the waiter in the hotel to understand what he wanted for dinner, so he drew a picture of some mushrooms and a cow, meaning in English "mushrooms and steak." The smiling waiter soon returned and handed him an umbrella and a ticket to the bullfight. Almost on par with substituting an ordinary saw for a Simonds Inserted Tooth blade.

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We said "Red Streaks cut like lightning," the reference being to Simonds High Speed Steel Hack Saw blades. Since then users have raised our bid as evidenced by an unsolicited report sent in by a superintendent of a machinists' trade school. He states that one of these blades made 5000 cuts over a period of two months.

❖ ❖ ❖

Have you heard about the Widia Saw? It's a Simonds Inserted Tooth Saw with tips of Tungsten Carbide —almost as hard as a diamond. It is used for cutting asbestos, impregnated brake lining, friction block and other material.

ginia, District of Columbia and vicinity to cost $16,000,000, including new stations, equipment, lines, etc.

Consolidated Steel Products Co., 1410 West Clay Street, Richmond, Va., is inquiring for a 10-ton electric traveling crane, 30-ft. span; 40-hp. double-drum steam hoist; jaw crusher and elevator, stone crusher, industrial cars, etc.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 19 for quantity of steel wire rope for Charleston, Va., Navy Yard (Schedule 7224); one electric-driven cleaning machine for Quantico yard (Schedule 7220); 28 electric-operated portable pumps and spare parts for Eastern and Western yards (Schedule 7170); 20 flat cars, capacity 100,000 lb., for Philadelphia and other yards (Schedule 7232); until Jan. 26 for one motor-driven engine lathe for New York or San Francisco yards (Schedule 7223).

BUFFALO

Pavilion Natural Gas Co., Pavilion, N. Y., plans natural gas distributing plant and system at Pavilion and vicinity. Cost over $75,000 with equipment.

Precision Castings Co., Inc., Fayetteville, Syracuse, N. Y., has arranged for purchase of plant and business of Franklin Die Casting Corpn., 735 Gifford Street, Syracuse, subsidiary of H. H. Franklin Mfg. Co., manufacturer of automobiles. Purchasing company will dismantle Franklin plant, removing equipment to Fayetteville works and to branch plants, Cleveland, where production will be increased.

M. Bock & Son, Inc., Buffalo, has been organized with capital of $75,000 to take over and expand M. Bock & Son, Morgan Building, operating scrap metal and metal goods plant. Charles Bock heads new company.

Eclipse Machine Co., Elmira, N. Y., manufacturer of automotive and aviation equipment, subsidiary of Bendix Aviation Corpn., South Bend, Ind., is increasing capacity and will soon develop maximum schedule with about 300 additional workers.

Spring Perch Co., Stratford, Conn., manufacturer of automobile leaf springs, filed plans for two plant units on Hamburg Turnpike, Lackawanna district, 160 x 250 ft., and 60 x 200 ft. Cost about $125,000 with equipment. Company will remove to new location and increase capacity.

Unit Reproducers Corpn., Rochester, N. Y., has been organized to take over and expand company of same name at 999 Main Street East, manufacturer of radio and television equipment and parts. Floyd A. Terwilliger and William F. Wiebach head new organization.

CINCINNATI

Cincinnati Union Terminal Co., Temple Bar Building, Cincinnati, plans installation of conveying, elevating, loading and other equipment in mail terminal, two-stories and basement, 172 x 185 ft. Cost over $500,000 with equipment. Bids asked on building contract. H. M. Waite, chief engineer.

Ohio Bell Telephone Co., 750 Huron Road, Cleveland, authorized plans for three exchange buildings at Columbus, Ohio, for service in Randolph, University and Garfield districts. Cost $300,000 with equipment. Miller & Reeves, 203 East Broad Street, Columbus, architects.

Nu-Way Heat Controller Manufacturers, Inc., Cincinnati, care of Ratterman, Cowell & Fletcher, Enquirer Building, has been organized by Brooks Lipscomb and Elmer M. Bardon, Cincinnati, to manufacture heat regulating equipment and devices.

Contracting Officer, Wright Field, Dayton, Ohio, asks bids until Jan. 18 for five combination motor-driven circular saws (Circular 250); until Jan. 20 for number of gasoline tanks, 50, 100 and 200-gal. capacity (Circular 255).

Phillips-Rutorff Mfg. Co., 1401 Hamilton Street, Nashville, Tenn., manufacturer of gas ranges, heating equipment, etc., plans three-story addition to enameling plant. Cost about $30,000 with equipment.

City Council, Jellico, Tenn., plans municipal electric light and power plant. Cost $150,000 with equipment. E. S. Miller, chairman, Light and Power Committee, in charge.

United States Engineer Office, Memphis, Tenn., asks bids until Jan. 22 for one 10-ton steel whirler derrick (Circular 393); until Jan. 21 for indicators and recorders, and recording thermometers (Circular 392).

City Council, Piqua, Ohio, contemplates early call for bids on general contract for municipal electric light and power plant. Bonds for $810,000 approved. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer. James Montgomery, City Hall, director of public service.

City Council, Ludlow, Ky., has plans by Glazier & Morlidge, Broeman Building, Cincinnati, engineers, for municipal waterworks, including electric-operated pumping station, water-softening machinery, piping, etc. Cost $120,000. Fosdick & Hilmer, Union Trust Building, Cincinnati, consulting engineers.

Bradford Machine Tool Co., Cincinnati, is in receivership. W. R. Stuebing, Jr., was appointed receiver. Stockholders have petitioned for dissolution.

CHICAGO

Sanitary District of Chicago, 910 South Michigan Avenue, asks bids until Jan. 21 for West Side sewage treatment works, including rotary dryer, 96 in. diameter and 70 ft. long, with stoker, conveyors, coal and ash-handling equipment, vacuum type filter complete with vacuum and sludge pumps, sludge concentration tank, 35 ft. diameter and 15 ft. deep, with mechanical thickening mechanism, and complete accessory equipment. James J. Sullivan is clerk.

Sears, Roebuck & Co., Arthington Avenue and South Homan Street, Chicago, will expand its agricultural equipment division to include power tractors and other power farm machinery. Service and repair plants will be established in different centers of country. David Bradley Mfg. Works, Bradley, Ill., a subsidiary, will manufacture a general purpose tractor to be distributed by parent company. Company has established full time production schedule on 10-hr. day basis, and will increase working force to over 400 men.

Iowa-Nebraska Light & Power Co., Clarinda, Iowa, plans extensions and improvements in local light and power plant, with installation of new generating unit and auxiliary equipment. Work will begin in about 60 days. Cost over $65,000 with equipment.

Penick & Ford, Ltd., First Street, S. W., Cedar Rapids, Iowa, manufacturer of canned food products, has awarded general contract to Lightner Brothers, 96 Second Avenue, S. W., for three-story addition, 40 x 50 ft. Cost over $80,000 with equipment.

Public Service Co. of Colorado, Denver, is arranging for expansion and improvements to cost close to $2,000,000, including completion of steam-electric generating plant at Sterling, Colo., now under way, $250,000; new hydro-electric generating plant at Orchard Mesa, Colo., about $200,000; overhead and underground transmission lines at Denver and other points, $500,000; new coal-handling unit at Valmont power plant, $175,000; extensions and betterments in hydroelectric generating plant at Boulder Canon, $225,000; new gas mains and other gas construction, $250,000; miscellaneous construction, $300,000.

Maizewood Products Corpn., Railroad Avenue and Salina Streets, Dubuque, Iowa, manufacturer of wallboard and kindred products, will take bids soon on general contract for rebuilding one and four-story mill, 60 x 500 ft., recently destroyed by fire. Loss over $100,000 with machinery. A. Byron Hunicke is plant engineer. Executive offices at 203 North Wabash Avenue, Chicago.

One-Minute Mfg. Co., maker of washing machines, Newton, Iowa, has been acquired by a syndicate headed by Julius D. Adelman, Des Moines, Iowa, and a new corporation organized under Delaware laws. Mr. Adelman will be president; Clyde B. Charlton, Des Moines, vice-president; R. C. Hammer, Newton, secretary-treasurer. Plant will remain in Newton, it is understood.

MILWAUKEE

Standard Oil Co. of Indiana, 414 West Michigan Street, Milwaukee, has leased from city of Milwaukee several acres on Jones Island, including dock facilities, for new oil storage plant. Initial installation will consist of five 33,000-gal. tanks. Improvements to cost $300,000.

Burgess Battery Co., Madison, Wis., maintaining plants in Madison and Freeport, Ill., is segregating acoustical products department from dry battery and flashlight division and hereafter will use Freeport plant exclusively for battery division and Madison plant for acoustical products, including exhaust mufflers and intake silencers for gasoline engines, air compressors, etc.

Barber-Colman Co. of Wisconsin, Milwaukee, has moved its offices and service shop from 2561 North Downer Avenue to 914 North Broadway. E. H. Kietzman is branch manager.

Cleaver-Brooks Co. of Wisconsin, Milwaukee, has been incorporated to manufacture tank car and other heating equipment for heating all grades of bituminous materials, mineral aggregates, etc. Headquarters have been established at 740 North Plankinton Avenue. J. C. Cleaver is president and R. E. Brooks is secretary and treasurer.

City of Marquette, Mich., has engaged Pearse, Greeley & Hansen, consulting engineers, 6 North Michigan Avenue, Chicago, to take charge of $40,000 municipal waterworks improvement project. M. A. Hagan is city clerk.

Manitowoc Iron & Metal Co., Manitowoc, Wis., has been incorporated with $50,000 capital stock to succeed partnership of 33 years between David Balkansky and Abe Schwartz, 1015 Buffalo Street.

Waukesha Motor Co., Waukesha, Wis., maker of industrial gasoline and Diesel engines, has contracted with Sears, Roebuck & Co., Chicago, to supply power plants for new line of tractors it is introducing by way of entering power farm equipment field.

National Equipment Corpn., 3026 West Concordia Avenue, Milwaukee, reports orders valued at $100,000 for gasoline shovel, paving and concrete mixing equipment during past two weeks.

Chain Belt Co., Milwaukee, is placing in quantity production new roller chain for high speed and lighter industrial operations to supplement line of heavy type chain for oil fields, sawmills, and agricultural and construction machinery.

Moise Steel Co., 4027 West Scott Street, Milwaukee, jobber of bars, shapes and plates, has been appointed State distributer for Jessop Steel Co.'s line of tool steel. Company is also starting distribution of complete line of stainless and non-corrosive sheets and bars. Plant is equipped with three sheet, one plate and one bar shearing unit for cutting to consumers' needs.

CLEVELAND

W. A. Howe Co., 2630 Payne Avenue, Cleveland, manufacturer of lithograph specialties, contemplates two-story plant. Cost about $40,000 with equipment.

Moody & Thomas Co., Peninsula, Ohio, plans rebuilding part of floor mill recently destroyed by fire. Loss about $100,000 including equipment.

Victor Stove Co., Salem, Ohio, has been organized by Warren W. and Lowell H. Brown, Salem, to manufacture stoves, parts, furnace equipment, etc.

General Electric Co., Lamp Division, Nela Park, Cleveland, is considering removal of branch plant of electric lamp works, Harrison, N. J., to plant at Nela Park, where operations will be expanded.

Department of Public Utilities, City Hall, Cleveland, E. H. Kreuger, director, contemplates installation of steel water tank in Garfield Heights district, about 1,000,000 gal. capacity.

Ohio Chevrolet Co., Toledo, Ohio, has adopted full time day and night schedule, each

It's Easier to Subtract *than to* Add . . *and the* Result *is the* Same

IF you could add 3 to 10% to selling price it would be fine for profits. But what would customers think and do? Subtract, then, from production costs . . . and you have the same chance to earn a profit.

Many manufacturers are letting G. P. & F. help them make subtraction do the same thing as addition. The shell drawn from stainless steel shown, is an example of what can be done.

The use of G. P. & F. stampings cuts material and finishing costs . . . and eliminates machining costs entirely. Better still, it adds sales appeal . . . lighter weight, increased convenience, durable modern finishes, and beauty of design.

G. P. & F. has 50 Years' Experience

More than half a century of experience . . . an ever-growing clientele including many of the largest manufacturers of the country are guarantees that G. P. & F. engineering and design service is almost certain to boost your profits. A few moments of your time is the only cost of finding out what G. P. & F. stampings will do for your profits and your product. Just send a sample or drawing and let us recommend: No obligation whatever.

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Shell drawn by G.P.&F. from 16-gauge stainless steel. Two parts of shell are welded together after assembly.

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8-hr. shifts, six-day week basis, at local plant, giving employment to 2000 men.

Schulte Grinding & Polishing Machine Co., Inc., Cleveland, manufacturer of sheet and strip grinding machines, has moved from 1958 West Forty-fifth Street to 6400 Breakwater Avenue, N. W.

PITTSBURGH

School District of Shaler Township, Allegheny County, care of Ingham & Boyd, Empire Building, Pittsburgh, architects, asks bids until Jan. 18 for two electric drive automatic stokers for new high school. A. C. Peightel, secretary.

Pittsburgh 'Lectromelt Corpn., Pittsburgh, has been organized by M. M. Balash, 861 Maginn Street, and W. F. Downing, 1464 Elm Street, Wilkinsburg, to manufacture heat-treating and melting furnaces.

Washington Hotel Co., Washington, Pa., plans one-story automobile service, repair and garage building, 75 x 120 ft. R. G. Dickson, 6028 Center Avenue, Pittsburgh, architect.

United States Engineer Office, Huntington, W. Va., asks bids until Jan. 18 for quantity of steel cover plates and structural steel hinge plates (Circular 133).

Fairmont Foundry & Mfg. Co., Fairmont, W. Va., recently organized to take over local foundry interests, contemplates improvements in plant, including installation of monorail cranes, core furnace, coke oven, portable grinders and other equipment. Lewis J. Carskaden, 311 Leona Court, is president and general manager.

Viscose Co. of America, Inc., Parkersburg, W. Va., has secured permission to install electric-operated pumping plant at Government reservation, Lock No. 1, Little Kanawha River, with centrifugal pumps, pipe lines, transmission line, etc., for service at rayon mill. Headquarters are at Marcus Hook, Pa.

Hydraulics, Inc., Pittsburgh, has been organized by Benjamin Lassman, 5857 Bartlett Street, and associates to manufacture hydraulic machinery and parts.

McConway & Torley Co., steel castings, Forty-eighth Street and A. V. Railway, Pittsburgh, has changed its name to McConway & Torley Corpn.

INDIANA

Shell Petroleum Corpn., 2219 West Michigan Street, Indianapolis, has let general contract to Krebay Construction Co., 108 East Pratt Street, for one-story additions to bulk oil storage and distributing plant, including pumping plant. Cost about $35,000 with equipment.

Board of Trustees, Purdue University, West Lafayette, has plans for three-story and basement mechanical engineering building, 60 x 230 ft., forming second unit of new group. Bids on general contract will be asked early in spring. Cost about $200,000 with equipment. Walter Scholer, Wallace Building, Lafayette, architect.

Decelerite Corpn., Wabash, has been organized by John E. Gregson and R. H. MacGregor, Wabash, capital $100,000, to manufacture mechanical rubber products, including brake lining, etc.

City Council, Winchester, will install sewage disposal plant, with pumping machinery, loading, conveying and other equipment. Cost $75,000.

City Council, Brasil, has plans for municipal electric light and power plant. Cost about $140,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., engineer.

Durham Corpn., Muncie, has been organized by George A. Ball and Frank B. Bernard, Muncie, to manufacture automobile equipment and accessories.

Ertel Machine Co., Inc., Indianapolis, has been organized to manufacture special machine tools and other machinery. Directors are John C. Ertel, Jr., Robert H. Watson and Charles O. Roemler.

GULF STATES

Central & South West Utilities Co., Dallas, Tex., operating Central Power & Light Co., San Antonio, Tex., and other electric power utilities, is arranging fund of $2,500,000 for expansion and improvements, including completion of 16,000-hp. power plant of Central company at Eagle Pass, Tex., transmission lines, and other construction.

Commercial Pulp & Paper Co., Orange, Tex., recently organized, will take over local mill of Yellow Pine Lumber Mill Co., and will remodel for production of coated papers, waxed and other processed stocks. Cost over $100,000 with equipment. C. A. Keiren, engineer and mill superintendent.

George Steingruber, Huntsville, Ala., and associates are organizing company to manufacture stoves, ranges, etc. It is planned to take over and expand local plant of Belle Electric Range Co.

Airport Commissioners, Mobile, Ala., plan extensions and improvements at municipal airport, including hangar, with shop and reconditioning facilities, and other field units. Bond issue of $75,000 will be arranged.

Board of Education, Dallas, Tex., plans manual training department in new two-story junior high school in Trinity River district, to be erected in two units. Cost of first unit, $200,000, and second unit, $150,000. Bryan & Sharp, Construction Industries Building, are architects; C. M. Moore, business manager for school board.

Terrebonne Parish School Board, Houma, La., contemplates manual training department in new one-story school for negroes, 60 x 150 ft. Bids on general contract until Jan. 21. Theard & Matthews, Balter Building, New Orleans, architects; T. G. Chachere, Houma, associate architect. Cost about $60,000.

Beacon Oil & Refining Co., Henderson, Tex., plans rebuilding part of oil refinery recently destroyed by fire. Loss about $30,000 with equipment.

United States Refining Co., E. L. Chapman, Fort Worth National Bank Building, Fort Worth, Tex., president, has acquired former plant of Southport Refining & Export Co., Southport, New Orleans, and will remodel for production of engine oils, gas oil and similar products, with department for gasoline manufacture. Cost over $100,000 with equipment. F. H. Leahy Engineering Co., 109 Tchoupitoulas Street, New Orleans, engineer.

City Council, Starkville, Miss., has low bid from Harrison-Wright Co., Charlotte, N. C., for municipal electric light and power plant, and distribution system at $88,500.

ST. LOUIS

Missouri Pump & Equipment Co., 1019 Tower Grove Avenue, St. Louis, manufacturer of pumping machinery, parts, etc., has plans for one-story factory, 50 x 90 ft.

Anchor Mfg. Co., South Kimbrough Street, Springfield, Mo., manufacturer of incubators, window display fixtures, etc., let general contract to M. E. Gillioz, Monett, Mo., for one-story plant, 75 x 150 ft., to replace unit recently destroyed by fire. Cost about $70,000 with equipment. F. G. Hentschel, 1211 South Pickwick Avenue, architect.

Ozark Pencil Co., 6118 Gambleton Street, St. Louis, has leased building at Lewisburg, Tenn., for branch plant for manufacture of novelty pencils.

Oklahoma Aviation Service, Inc., 2130 West Park Street, Oklahoma City, Okla., has secured permission for hangar, 105 x 120 ft., with repair and reconditioning shop, at municipal airport, including administration building, 30 x 120 ft. Cost over $45,000 with equipment. C. T. Johnson, president.

Kroger Grocery & Baking Co., 35 East Seventh Street, Cincinnati, takes bids soon on general contract for four-story baking plant, 85 x 130 ft., at St. Louis, including traveling ovens, conveyors, mixing machinery and other equipment; also, automobile service, repair and garage unit for company cars and trucks, and boiler plant. Cost about $750,000 with equipment. Emil H. Niemann, 3816 Shaw Avenue, St. Louis, architect.

City Council, Eldorado, Kan., has revised plans for municipal gas distribution system, with pressure station and other equipment. Cost over $80,000. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., engineer; Emporia Engineering Co., Emporia, Kan., associate engineer.

White River Power Co., affiliated with Arkansas Power & Light Co., Pine Bluff, Ark., is making test borings and carrying out other engineering work preparatory to erection of new hydroelectric generating plant on White River, near Wildcat Shoals. Power dam will be built to provide artificial lake 100 mi. long for water storage. Development will cost close to $20,000,000 with transmission system. Charles S. Lynch, chief engineer, Arkansas Power & Light Co., in charge.

J. G. Jakobe & Sons, Inc., 818 East Fifteenth Street, Kansas City, Mo., sheet metal works, contemplates new one-story plant.

Ripplinger Electric & Machine Works, Inc., St. Louis, has been organized by Theodore J. Ripplinger and associates to take over and expand company of same name at 4357 Delor Street, manufacturer of electrical and mechanical equipment.

City Council, Oklahoma City, Okla., received low bid from Barbour & Short, Norman, Okla., for one-story hangar, 120 x 120 ft., with repair shop, at municipal airport. Cost about $35,000 with equipment. M. B. Baldwin, Magnolia Building, architect; L. M. Bush, City Hall, city engineer.

DETROIT

Fitzjohn Body Co., Muskegon, Mich., has been organized by Thomas H. Hume, Muskegon, and associates, to take over plant of Fitzjohn Mfg. Co., manufacturer of motor bus and other automobile bodies, in receivership for past six months. New organization has purchased assets for $39,043 and will continue plant for same character of body-building. Mr. Hume was secretary and treasurer of former company.

Ford Motor Co., Dearborn, Mich., will soon begin erection of one-story plant, 160 x 330 ft., at Ypsilanti, Mich., where hydroelectric power development is now under way. Entire project will cost over $500,000. Albert Kahn, Inc., Marquette Building, Detroit, is architect for plant unit. Ford company has plans for two new power substations for steel mill and glass plant at Dearborn. Cost over $75,000 with equipment. Giffels & Vallet, Inc., Marquette Building, engineers for last noted work.

White Lumber Co., Boyne City and Sault Ste. Marie, Mich., has organized Northern Lumber Co. to establish electric-operated lumber mill on Batchawana River, near Sault Ste. Marie, Ont. Project will include saw mill, planing mill, power station and other units. Cost over $85,000 with machinery. Present plants will be removed to new location.

Village Council, Hart, Mich., is planning erection of municipal electric light and power plant, to cost about $55,000 with equipment.

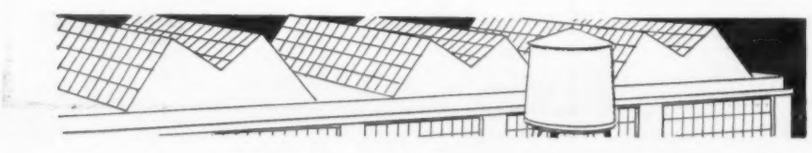
National Boiler Corpn., 2324 Dime Bank Building, Detroit, has been organized by Harlow B. Loveland, 17595 Muirland Avenue, and John J. Power to manufacture boilers, tanks and kindred plate products.

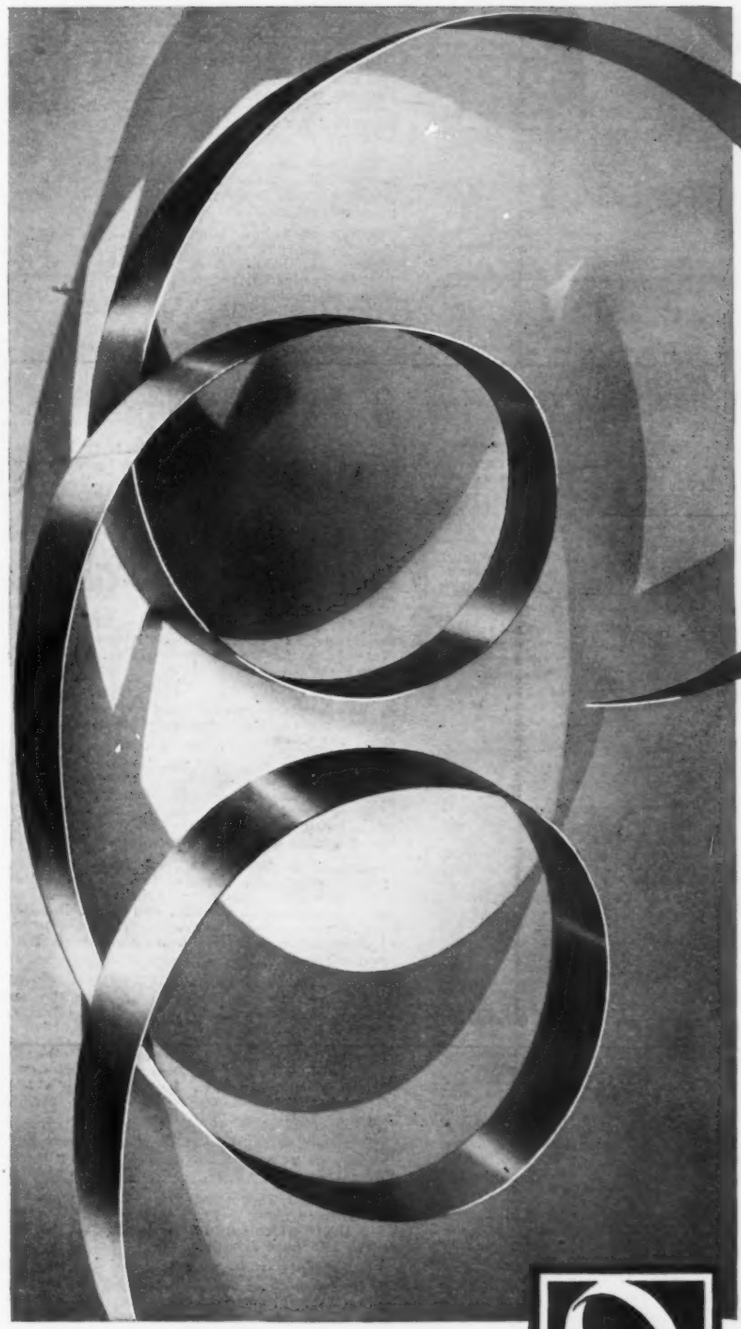
Hudson Motor Car Co., 12601 East Jefferson Street, Detroit, has organized Hudson-Essex of Canada, Ltd., to operate parts and assembling plant at Tilbury, Ont., for Hudson and Essex automobiles.

Essex Wire Corpn., 37 Manchester Street, Detroit, manufacturer of wire and cables, etc., has acquired plant and business of New York Insulated Wire Co., Wallingford, Conn. Purchasing company will continue Wallingford plant under same name.

Consolidated Concrete Machinery Co., Adrian, Mich., manufacturer of concrete mixing equipment, parts, etc., is completing removal of plant to Alpena, Mich., where production will be concentrated. Executive offices will be maintained at new location. Besser Mfg. Co., Alpena, recently acquired controlling interest in Consolidated company.

Briggs Mfg. Co., 11631 Mack Avenue, Detroit, manufacturer of steel automobile bodies, has developed new type of steel refrigerator cabinet and will arrange department for new line of output. Large order has been secured from Westinghouse Electric & Mfg. Co., East Pittsburgh, for new cabinets for Westinghouse refrigerating units.





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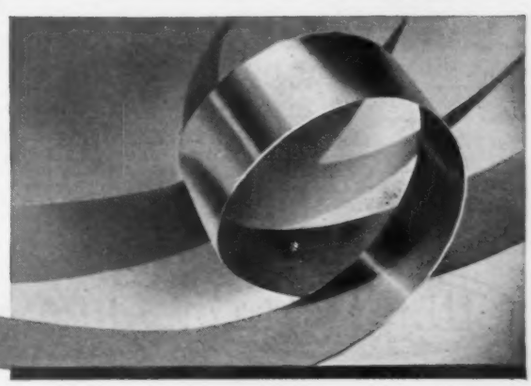

PACIFIC COAST

El Dorado Oil Works, Third and University Avenues, Oakland, Cal., manufacturer of refined oil, plans one-story plant, 100 x 650 ft., with one-story storage and distributing building adjoining, 40 x 415 ft. Cost over $200,000 with equipment. Ellison & Russell, Pacific Building, San Francisco, architects and engineers.

Chrysler Corpn., 341 Massachusetts Avenue, Detroit, plans new assembling plant on 30-acre tract in industrial district, Los Angeles, recently acquired, consisting of several one-story units for Chrysler, Plymouth, DeSoto and Dodge passenger automobiles and Graham motor trucks. Cost about $2,000,000 with equipment.

San Joaquin Light & Power Corpn., Fresno, Cal., plans expansion and improvements to cost $430,750, including additions in power stations, transmission and distributing lines and substations.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 26 for following tools for Mare Island Navy Yard: One turret lathe (Schedule 7217), one engine lathe (Schedule 7218), one precision lathe (Schedule 7222), one ball bearing single surface planer (Schedule 7225), all motor driven; until Jan. 19 for quantity of wire rope and plow steel wire rope (Schedule 7191), oil and waterproof cable (Schedule 7228), and 10,000 ft. pneumatic tool hose (Schedule 7214); until Jan. 26 for one motor-driven disk and spindle sander, and one motor-driven tilting arbor universal saw table (Schedule 7227) for San Diego Navy Yard.

Apple Growers' Cold Storage Co., Beach Road, Watsonville, Cal., plans one-story addition to cold storage and refrigerating plant. Cost close to $100,000 with machinery. Hunter & Hudson, 41 Sutter Street, San Francisco, mechanical engineers.

Southern California Edison Co., Los Angeles, has authorized budget of $11,397,000 for 1932 expansion and improvements, of which about $181,000 will be used for hydroelectric power stations; $7,026,000 for extensions in distributing lines, power substations and miscellaneous construction; $1,862,000 for new steel tower and other transmission lines. About $159,000 will be used for garage equipment and maintenance for motor trucks and cars.

Vernon Pattern Works, Inc., Huntington Park, Cal., has been organized to take over and expand company of same name at 2020 Laura Street, manufacturer of metal and wood patterns, etc. Edward Messerschmitt and A. J. Muhlbach head new company.

Monterey Peninsula Packing Corpn., Monterey, Cal., contemplates new fruit and vegetable canning plant, with automatic canning machinery, conveying, elevating and other equipment. Cost over $125,000 with machinery.

Bureau of Water and Power, City Hall, Los Angeles, plans installation of additional generating equipment and auxiliaries at municipal San Francisquito power plant, in connection with 1932 expansion and betterments. Cost about $500,000. E. F. Scattergood is chief engineer.

Vallejo Junior High School District, Vallejo, Cal., contemplates manual training department in new two-story junior high school to cost about $225,000. Frederick H. Reimers, 233 Post Street, San Francisco, architect; Davis-Pearce Co., Grant and Webster Streets, Stockton, Cal., associated architects.

CANADA

W. C. Miller, city engineer, St. Thomas, Ont., will start work at once on erection of a sawmill to have daily capacity of 10,000 ft. Company will build a dry kiln in spring and is interested in prices on sawmill and dry kiln equipment.

W. C. Miller, city engineer, St. Thomas, Ont., will receive bids until Jan. 22 for motor-driven centrifugal pumping unit for waterworks plant.

E. B. Eddy Co., Ltd., Bridge Street, Ottawa, Ont., will make further additions to its plant during year. Victor Drury, 360 St. James Street West, Montreal, is president; M. Pratt, care of company, architect.

Silent Glow Oil Burner Corpn., 6320 St. Hubert Street, Montreal, will build plant addition to cost $100,000.

Smith Agricultural Chemical Co., Columbus, Ohio, will establish its Canadian branch factory at plant of Witts Fertilizer Co., R. No. 1, Norwich, Ont.

Universal Cooler Co., Ltd., Chicago, has acquired Brantford Specialty Co.'s building at Brantford, Ont., for manufacturing purposes.

FOREIGN

Ministry of Finance, Government of Honduras, Tegucigalpa, Honduras, is planning new 200-mile railroad, supplementing present 70-mile line of Honduras National Railways, to require over six years for completion. Cost about $8,000,000 with equipment, including rolling stock, shops, etc.

Department of Interior, Cairo, Egypt, asks bids until Feb. 18 for equipment for electric power plant, including Diesel engine-generator of 400 kva. capacity, electric-operated centrifugal and other pumps, and complete auxiliary equipment.

Taiwan Electric Power Co., Island of Taiwan, Formosa, operated jointly by Government and private interests, will soon begin hydroelectric power development near Lake Jitsugetsutan, with ultimate capacity of 100,000 kw. Machinery awards are being made. Project will cost over $25,000,000 with transmission lines, switching stations and other equipment for service in all parts of island. Loan of $22,800,000 has been secured to carry out development.

Central Asiatic Lead Combine (Sredazsvinyetz), Soviet Russian Government, Moscow, plans development of lead and zinc ore properties in Turian district, with installation of mining machinery, power and pumping equipment; concentration plant will be built. Smelting works with power house will be built at Kazakstan. Project will cost 25,000,000 rubles (about $12,500,000) with equipment. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.

National Oilwells Department, Government of Argentina, Buenos Aires, plans development of oil properties in State fields of Province of Salta, with installation of oil drilling machinery, pipe lines, power and pumping stations, etc. It is planned to build refinery at Tucuman, with storage and distributing facilities. Fund of $3,000,000 is being arranged for program.

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New Trade Publications

Worm Gear Speed Reducers. — Cleveland Worm & Gear Co., Cleveland. Bulletin No. 112, 48 pages, gives drawings, dimensions of various types, and much informative material. Units include two types in which the low speed shaft is vertical and four types in which it is horizontal. Reductions up to 100 to 1 are provided by single worm and gear units; double reduction units are offered for ratios as high as 10,000 to 1.

Centrifugal Pumps.—DeLaval Steam Turbine Co., Trenton, N. J. Catalog B-3 covers balanced single suction series pumps; these are two-stage units having single suction impellers placed back to back. Hydraulic balancing is obtained the same as in a single stage, double suction pump.

Form Turning Machine.—Monarch Machine Tool Co., Sidney, Ohio. This machine, described in a new 28-page catalog, is a combination of the company's helical geared Timken bearing equipped lathe with Keller automatic electrical controls. It is primarily designed for machining any irregular contour—triangular, square, hexagon, round or oval—for which a thin master templet can be made. Accuracy within 0.001 in. of the master templet is claimed for the finished work.

Engine Lathes.—R. K. LeBlond Machine Tool Co., Cincinnati. The new "Regal" line of geared-head engine lathes for experimental, repair and manual training work is covered in an attractive 40-page catalog. Sizes of these lathes range from 10 to 18 in., both floor and bench types. A 72-page instruction manual, on "Running a Regal," has also been published; a charge of 25c. is made for this booklet.

Magnetic Clutches.—Magnetic Mfg. Co., Milwaukee. Four-page bulletin gives features and operating characteristics of the Stearnes multiple-disk magnetic clutch.

Structural Arc-Welding. — Lincoln Electric Co., Cleveland. Attachment of the end bay purlins of a mill building addition to the frame of an existing structure is discussed in plate 30 of the company's "Studies in Structural Arc-Welding."

Geared-Head Motors.—Master Electric Co., Dayton, Ohio. Data book section No. 210 illustrates various installations of small geared-head motors.

Automatic Screw Machine.—Tripex Machine Tool Corpn., 50 Church Street, New York. Eight-page booklet gives specifications of the Bechler universal high precision automatic screw machine.

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Trade News

Foster Machine Co., Elkhart, Ind., has designated Dean Machinery Co. as its dealer in the Chicago territory. The Dean company will be assisted by Harry Lyon, who has been a direct Foster representative for many years.

Pfaudler Co., Rochester, N. Y., has received an order from the Dairymen's League Cooperative Association for 33 4000-gal. and 12 3000-gal. steel milk storage tanks for delivery next spring.

Apex Smelting Co., Chicago, has changed the trade name of its new aluminum alloy product, heretofore known as "Perm-Brite," to "Apex 400 Alloy."

Halpin-Kohrbry, Inc., 4116 Clayton Avenue, St. Louis, has been appointed exclusive distributer in the St. Louis territory for Hobart constant arc welders.

Moise Steel Co. of Ohio, Linwood Avenue and Pennsylvania Railroad, Cincinnati, has established warehouse stocks of a complete line of sheet metal supplies. A. J. Conn and Harry W. Schwab, formerly with Follansbee Brothers Co., are associated with the company.

Babcock & Wilcox Co., 85 Liberty Street, New York, has consolidated its sales offices with those of Fuller-Lehigh Co., Fullerton, Pa., which it purchased in 1926, and all business of both companies will be transacted in the name of Babcock & Wilcox Co. through its district sales offices.

Cincinnati Steel Products Co., Carrel Street and Pennsylvania Railroad, Cincinnati, has been organized as a sheet steel distributer. J. W. Herr is president.

Brown & Zortman Machine Co., Pittsburgh distributer of machine tools and machinery, has removed its offices from 325 Boulevard of the Allies to South Second and McKean Streets, South Side, Pittsburgh.

Bethlehem Steel Co. and McClintic-Marshall Corpn., have moved their Boston office to 75 Federal Street.

R. S. Ernst, representing Northern Pump Co. and Hardie-Tynes Mfg. Co., has moved from 2717 South Michigan Avenue, Chicago, to 520 North Michigan Avenue.

American Rolling Mill Co. has removed its Cincinnati district office to the company's home offices in Middletown, Ohio. Resident salesmen will remain in Cincinnati and direct telephone communication between Cincinnati and Middletown will be maintained.

Lukenweld, Inc., division of Luken Steel Co., Coatesville, Pa., has appointed Welding Engineering Co., 2872 North Forty-first Street, Milwaukee, as its Wisconsin representative, and Marvine Gorham, Jackson Building, Buffalo, as representative in the Buffalo territory, including Erie County, Pa., and New York from the western boundry to Utica.

Baker-Rauling Co., 2168 West Twenty-fifth Street, Cleveland, material handling equipment, has made the following appointments to its sales staff: R. A. Clark, 260 Park Square Building, Boston, New England representative; Frank E. Witte, Frank E. Witte Co., 1061 Howard Street, San Francisco, and H. S. Fuller, 810 Terminal Sales Building, Seattle, Wash., Pacific Coast representatives.